Vol. XX. February, 1901. No. 2.

MUNICIPAL ENGINEERING

A MONTHLY MAGAZINE

DEVOTED TO THE IMPROVEMENT OF CITIES

PAVING, SEWERAGE, WATERWORKS,
STREET LIGHTING, PARKS, STREET CLEANING,
GARBAGE DISPOSAL, PUBLIC SANITATION, BRIDGES.

PUBLISHED BY
MUNICIPAL ENGINEERING COMPANY
INDIANAPOLIS AND NEW YORK.

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FEB 7 1902

Two Dollars Per Year. Single Copies, 25 Cents.

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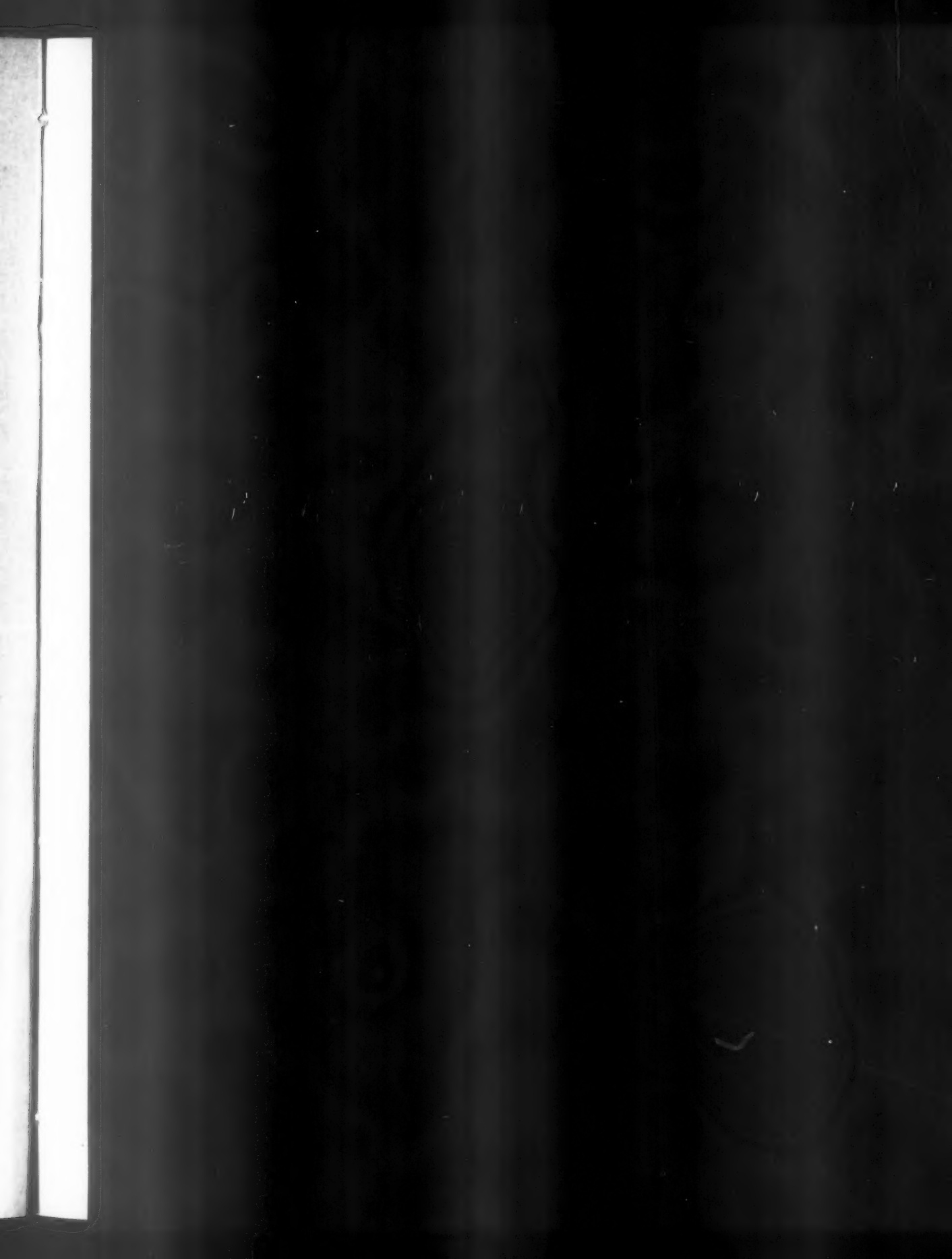


Municipal Engineering

VOLUME XX. FEBRUARY, NINETEEN HUNDRED ONE. NUMBER 2.

MELAN ARCH BRIDGES IN INDIANAPOLIS.

By B. J. T. Jeup, City Engineer of Indianapolis.

About two years ago the board of public works of the city of Indianapolis considered the question of replacing many of the old steel and iron bridges by new bridges of a more permanent character. Some of the old bridges had been constructed over thirty years and were originally designed as county road bridges, and were not adapted for the heavy loading to which city bridges are subjected. One of the bridges—the old Illinois street bridge—had been frequently strengthened and patched in order to sustain the load of the street railway cars, but its factor of safety was very low. The board of public works at that time decided to replace two of these bridges across Fall creek by new bridges, and, in view of the fact that Fall creek was to be improved and boulevards constructed on either side, it was deemed desirable to construct stone bridges across this creek. It was at first contemplated to have these bridges built entirely of natural stone, but in order to insure a greater water-way without greatly increasing the width of the stream it was found to be more economical to construct these bridges of the Melan arch type. The contracts for two Melan arch bridges were let in November, 1899, for bridges across Fall creek at Illinois street and Meridian street, Illinois street having a double street railway track and Meridian street being the main thoroughfare running through the residence portion of the city.

These two bridges are each skew bridges, the lines of the piers and abutments making an angle of 70 degrees with the street line. Each bridge is composed of 3 arches of 74-foot span. The piers and abutments are constructed of concrete to a depth of 10 feet below the low water level of the creek. The piers are 8 feet wide and the abutments 20 feet. The specifications for the concrete provided for a mixture of 1 part of cement, 4 parts of sand and 8 parts of screened gravel, but in the actual construction the concrete was made with one part of Atlas Portland cement, 3 parts of clean sand and 6 parts of screened gravel. Stones taken from the piers and abutments of the old bridge, which were found in sound condition, were used in the concrete of the new piers and abutments. The concrete for the arches was made in the proportion of 1 part of Alsen cement, 2 parts of sand and 4 parts of screened gravel. The thickness of the arches at the crown is 16 inches and at the piers and abutments 60 inches. Spaced 3 feet from center to center in the concrete of the arches are 10-inch I-beams weighing 25 pounds to the lineal foot. The beams were bent at the mills to conform to the plans of the arch and were shipped in two sections. Each beam was spliced at the center by means of top and side plates thoroughly riveted.

The general specifications for the bridges were such as have been adopted in the construction of concrete arches under the Melan and Thatcher systems. The piers and abutments from a depth of 2 feet below the low water level of the creek were faced with stone, as were also all the exposed surfaces of the sides of the bridge. The stone is oolitic limestone from the Romona quarries. Differing from most Melan bridges heretofore constructed, the railings of the two bridges were built entirely of stone. Photographic views of the bridges, together with views of the work in course of construction, explain more fully the character of the work.

A description of the method of mixing the concrete for these bridges may be of interest. For the Meridian street bridge the

FORMER MERIDIAN STREET BRIDGE, INDIANAPOLIS.

concrete was mixed by means of a Drake mixer, into which the gravel, sand and cement were fed after they had been partially mixed on an elevated platform. The mixed concrete from the mixer discharged into a box conveyor, as shown in the photograph. This box conveyor extended sixty feet from the mixer, and openings that could be readily closed were provided in the bottom, so that by means of chutes the concrete could be dropped to any portion of the piers, abutments and arches within the limits of a radius of sixty feet from a mixer. This method of mixing and conveying gave a thorough, intimate mixture of all the ingredients, but was open to the objection that the gravel and the mortar separated at times when the concrete dropped from the conveyor. This necessitated a partial remixing of the concrete by hand before it was rammed into place. The method of concreting as employed at the Meridian street bridge necessitated the frequent moving of all of the machinery, the concrete mixers and conveyors.

In the construction of the Illinois street bridge, the handling of the material was done according to a system similar to the one adopted in the construction of the Topeka, Kas., Melan arch bridge. Instead of one line of cable and buckets, as used at Topeka, two lines were used in the construction of this bridge. All of the concrete was mixed at one stationary plant, on the south bank of the creek. In a large funnel-shaped, elevated bin, divided into two compartments, were placed the gravel and sand. From this bin the gravel and sand were conducted, in proper proportions, into a revolving box, to which cement was added. The contents of this box were dumped into a Drake concrete mixer and mixed as long as necessary to procure a proper mixture. The mixed concrete (mixed in batches instead of continuously, as at the Meridian street bridge) was deposited in steel buckets and carried, by cables, extending from towers on opposite sides of the stream, to any place where the same was desired. When proper care was taken in lowering the buckets, it was not necessary again to turn the concrete by hand. A gravity mixer was also used on part of the Illinois street bridge with fairly good results, but the height of the drop was not sufficient at all times to secure a thorough mixture, and the mixer was open to the same objection as the system used at Meridian street, in that it frequently separated the mortar from the gravel.

Numerous tests of the strength of the

concrete, made from time to time as the work progressed, fully demonstrated the advantages of a mechanical mixer over mixing concrete by hand.

The contract for the Meridian street bridge included the paving of the sidewalks with cement and paving the roadway with asphalt. The contract for the Illinois street bridge included the paving of the roadway with creosoted yellow pine blocks and the paving of the sidewalks with cement. The contract price for the Illinois street bridge, which is 60 feet wide, was $50,900. The bridge was constructed by the Hoosier Bridge Company of this city. Ex-City Engineer H. A. Mansfield and Mr. C. A. Kenyon, of this company, were in charge of the work. The contract price for the Meridian street bridge was $54,440. The contract was let to Shover & Austin of this city.

HEATING FROM CENTRAL STATIONS.*

By Alton D. Adams, M. A. I. E. E., Boston, Mass.

Light and heat are in general demand. Central electric stations meet a part of the demand for light, but the remainder is supplied by other means because of the high cost of electric energy. Distributed electric energy is entirely unable to furnish heat at any price that makes it available for warming buildings, though it finds some application in cooking and the arts.

In spite of the great development that has taken place in electrical apparatus and systems of distribution, there seems small prospect that stations producing only electric energy can ever supply the great bulk of light and heat necessary in any community. The reasons for this limitation of electrical supply are obvious. Dynamos have already reached an operative efficiency of 90 to 95 per cent., so that little more is to be expected in this direction. The source of

FORMER ILLINOIS STREET BRIDGE, INDIANAPOLIS.

*Copyright, 1901, by Alton D. Adams.

MERIDIAN STREET BRIDGE, INDIANAPOLIS.

their energy is the weak spot in systems of electrical supply.

Aside from the few locations where water powers are available, electric stations are mostly operated with steam engines. With a combined efficiency of 80 per cent. for boilers, economizers and feed-water heaters, that is, 80 per cent. of the total heat energy of coal transferred to the water and steam by these means, and 17 per cent. efficiency for steam engines, corresponding to 13.57 pounds of steam at 175 pounds gauge per brake horse-power hour when feed water is heated to 126 degrees by steam in the condenser, the complete efficiency of a steam power plant is 13.6 per cent. As one horse-power hour is the equivalent of 2,545 heat units, such a steam-power plant consumes fuel containing 18,713 units of heat, or 1.44 pounds of coal per brake horse-power hour, allowing coal 13,000 heat units per pound. While only 13.6 per cent. of fuel energy is delivered at the dynamo shaft and the remainder is wasted, any electrical distribution system starts with little chance to supply cheap energy.

Allowing 90 per cent. for the average combined efficiency of all of the electrical equipment at a central station, and 95 per cent. efficiency for the distribution lines, with the steam power plant just considered 11.5 per cent. of fuel energy may be delivered to consumers as electric current. The remaining 88.5 per cent., or more, of fuel energy goes to waste at the great majority of electric stations.

If boiler plants on the premises of consumers show an efficiency equal to that just assumed for those at central stations, 6.7 times as much fuel must be burned in the latter as in the former to yield consumers an equal amount of heat energy. With electrical energy at 10 cents per kilowatt-hour, it costs as much for heating as coal at $381 per ton, with boilers of only 50 per cent. efficiency. This result is readily computed from the facts that one kilowatt-hour is the equivalent of 3,412 heat units, and that fair coal develops 26,000,000 heat units per ton on perfect combustion.

Illuminating gas, though a form of matter rather than a kind of energy, may be compared with systems of energy distribution, because of its general supply to the public, and the ease with which energy may be derived from it. It should be held in mind, however, that gas can only be applied to the warming of many buildings by com-

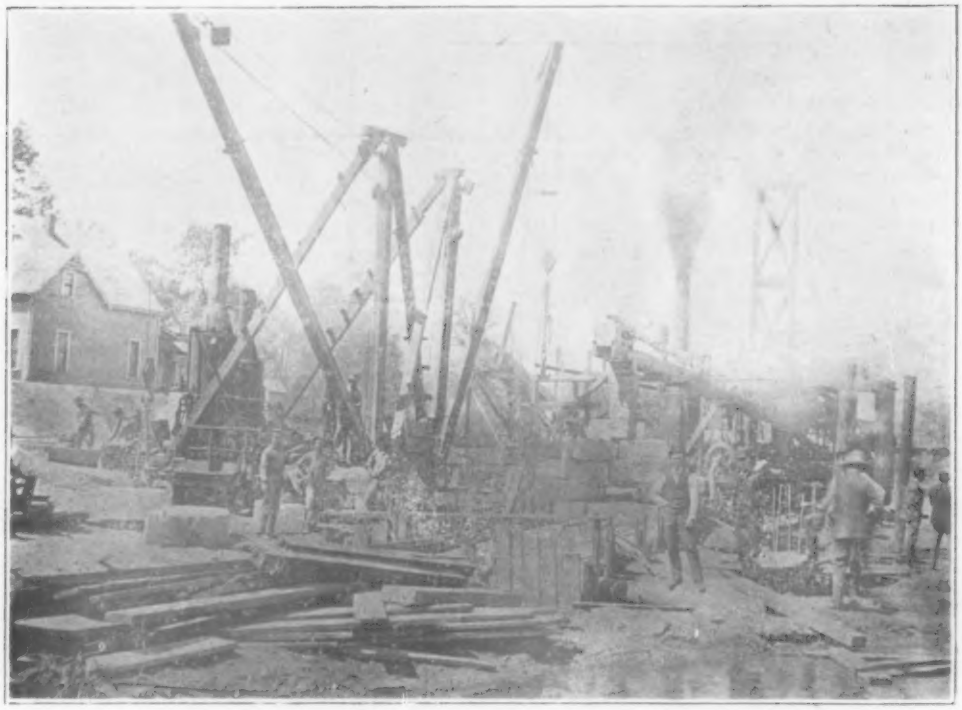
bustion in a boiler furnace, just as coal would be used, while electric energy, steam or hot water may be utilized directly in the room to be heated. The average illuminating gas, at the rate of $1 per 1,000 cubic feet, supplies, on perfect combustion, 650,000 heat units for this sum. If the apparatus in which the combustion of gas takes place yields, as useful heating effect, 75 per cent. of the contained energy of the gas, its cost is equal to that of coal at $26.66 per ton, when the coal contains 13,000 heat units per pound and is burned in apparatus of only 50 per cent. efficiency.

It is thus evident that neither electric energy nor gas can play an important part in warming buildings under present methods of production. The remaining available agents for the distribution of heat from central stations are steam and hot water.

Central heating stations may be, and are being conducted solely for the distribution of heat. In other, and the greater number of instances, the supply of heat is carried on from the same station that distributes electric energy. The independent heating station delivers the steam or hot water from its boiler directly to the distribution pipes. A combined electric and heating plant uses steam in its engines and then applies the engine exhaust to the heating system, either by circulating it directly in the pipes, or by using it to heat the circulating water. In addition to this use of exhaust steam, a combined electric and heating station may devote any desired part of its boilers to the heating system, as desired.

The combined efficiency of boilers and economizers at a central station may be as high as 80 per cent. The proportion of the heat of boiler water or steam that can be delivered to the pipes of a heating system depends on the character of the central station and the quality of its equipment. If the central station is devoted entirely to heat distribution by means of either hot water or steam, the total heat extracted from fuel by the boiler plant may be delivered to the distribution pipes. At central electric stations that distribute only exhaust steam for heating, the portion of total fuel energy that may be sent into the supply pipes drops to little less than 60 per cent. Hot water distribution, from central electric stations, shows a slight gain over the figure just given in the per cent.

MERIDIAN STREET BRIDGE, INDIANAPOLIS—CONCRETING OF ARCHES, SHOWING CONCRETE MIXER AND CONVEYOR.



MERIDIAN STREET BRIDGE, INDIANAPOLIS—CONSTRUCTING PIER.

of fuel energy imparted to the heating system by the exhaust steam. In so far as electric stations devote a part of their boilers to the supply of a heating system exclusively, the same per cent. of fuel energy may be delivered to distribution pipes as at an independent heating station.

A simple heating plant may distribute either high or low pressure steam or hot water. An electric station supplying heat with exhaust steam may distribute the exhaust at low pressure or use it to heat circulating water.

The losses from distribution pipes are very material factors in the efficiency of a public heating system, and these losses are subject to large variations according to the kind of distribution adopted and the extent and design of each particular system. Other factors remaining constant, the losses from distribution pipes are greater for a high than for a low pressure steam system, and greater for low pressure steam than for hot water. The actual rates of loss from distribution pipes may well range from 10 per cent. for a hot-water system, extending one-half mile from the station, to 25 per cent. for high pressure steam pipes one-half mile long. Taking a loss in distribution mains of 20 per cent. as a moderate figure, the independent heating system, with an efficiency of 80 per cent. at the boiler plant, is able to deliver to consumers 62 per cent. of the total heat energy of fuel.

At the central electric station transferring about 60 per cent. of the heating power of coal to the pipes of a distribution system, the loss of 20 per cent. in pipes allows the consumer to receive nearly 50 per cent. of the fuel energy. These figures for the efficiency of steam and hot water heating systems compare favorably with those of 25 per cent. for coal gas, 40 per cent. for water gas and 11 per cent. for electric energy, while the first cost of equipment and labor of operation for the steam and hot water systems is much less than for either of the others for an equal rate of energy output.

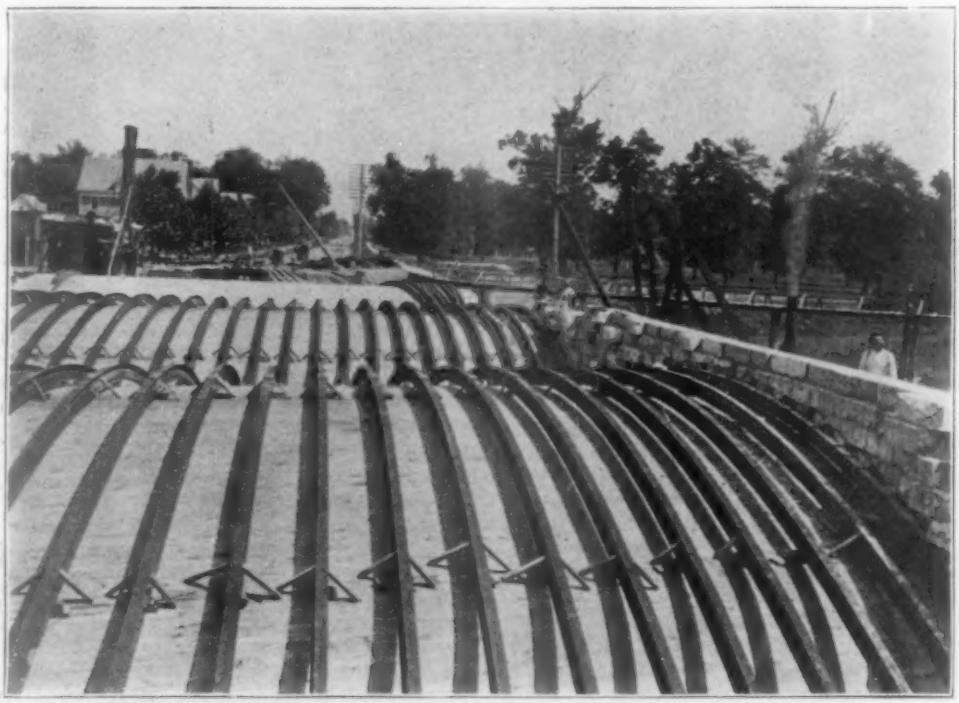
SELECTING A SYSTEM FOR FILTRATION OF WATER.

By Floyd Davis, E. M., Ph. D.

In considering a system of water purification for a city, efficiency, original cost and operating expense of a plant should be carefully considered.

With waters free from sewage, high bacteriological purification is entirely unnecessary. The problem is then one mostly of straining, and when there is not too much soluble organic matter present, both English and mechanical filters give good results. When the water contains too much soluble organic or coloring matter, the modified English and mechanical filters give best results, for these substances can be reduced most satisfactorily by the coagulant used. But with waters containing fresh sewage, no better filter can ordinarily be made than an English bed, because it is capable of removing as high a percentage of bacteria, gives more uniform results, and requires less skillful management than a mechanical system. Still, as far as a method of purification is concerned—for waters adapted to it—mechanical filtration will give as good results as can be accomplished by any other process, and the chemical, microscopical and bacteriological tests of the filtrate meet the most critical standards of permissibility that are applied to drinking waters.

Efficiency depends also upon adaptability, and in choosing between an English and a mechanical system, this should be considered. Sometimes a water that will coat over and render the sand quite impervious in an English bed, thereby creating too great an expense for operation, can be handled satisfactorily with mechanical filters; and it is also not infrequently the case that for a small water supply taken from sewage-polluted sources, mechanical filters will not give satisfaction, because the operating expense is too great, and the skill required for management is not at hand. Even with waters equally adapted to each, English filters may give better results than a poorly-managed mechanical system, but when the processes are skillfully conducted, and all the filtered water is used, as is customary when no sewage is present, the purification is as satisfactory from one system as from the other; and each is capable of reducing all suspended and chemical substances be-



MERIDIAN STREET BRIDGE, INDIANAPOLIS—I-BEAMS IN PLACE FOR ARCHES.

MERIDIAN STREET BRIDGE, INDIANAPOLIS—I-BEAMS SHOWING END CONSTRUCTION.

ow permissible limits, and of entirely removing all pathogenic and other objectionable bacteria.

The cost of constructing an English filter depends upon so many conditions that the exact amount can not be determined beforehand, except by contract, but it is safe to estimate that at present prices for materials, it will cost at least $100,000 per acre for properly constructed covered filters. An average rate of four million gallons per acre in twenty-four hours may be taken for one of these filters, and as it is necessary to have some bed in reserve while cleaning, about one and one-fifth acres are required for this daily amount of water. This will cost at least $120,000. Mechanical filters are rated at $7,000 per million gallons daily capacity, and for the four million gallons the cost is, therefore, $28,000. A suitable building necessary for the filters would cost, with heating appliances, perhaps $7,000 more, making a total expense of $35,000 for a mechanical filtering plant alone, against $120,000 for an English filter of the same capacity. Each system should be provided with a suitable storage reservoir of sufficient capacity for all emergencies, and with all connections and appliances necessary for handling the water. The cost of these is between $20,000 and $50,000, according to their capacity, but they are common to each system.

The main operating expense of an English plant is for cleaning and maintaining the filter bed. The frequency of this becomes a very serious objection to this process for some waters, since it adds too great an expense to the operation. It is estimated that it requires about thirty days' labor to scrape properly an acre of filter and remove and take care of the scrapings. This, at a cost of $1.75 per day, requires $52.50. Then it costs about thirty-two cents per cubic yard to wash the sand, and as an ordinary cleaning removes about one hundred and thirty-four yards per acre, the washing expense may be estimated at $42.88, making a total cleaning expense of $95.38 per acre, or about seventy-nine cents per million gallons of water filtered by a system that averages four million gallons per acre in twenty-four hours for a thirty days' run. But there are waters which clog the filter so rapidly that the expense of filtration greatly exceeds this amount, and this system is entirely out of the question as an economical means of purification: indeed it is an absolute failure. As a part of the operating expense should be added the cost of renewing the filter bed at least once or twice a

year. The more frequently it is cleaned the shorter its duration, the greater the filtering surface required, and consequently the greater the rebuilding expense.

For the mechanical system, the principal elements of expense of operation are for coagulant and wash-water. The aluminum sulphate used in this is worth about one and four-tenths cents per pound in commercial centers, and can be laid down in carload lots in most interior points for two cents per pound. With a water that requires one-half grain of this to the gallon of water filtered. Supposing that this is lifted twenty feet in washing the filters, the cost of wash-water for each million gallons of filtrate will be about twenty-seven cents. The total cost for these two items per million gallons is, therefore, about $1.69 against seventy-nine cents for an English system, as operating expense; but it should be understood that these figures differ widely for different waters, and may even change so that the operating expense of an English filter will exceed that of a mechanical plant.

MERIDIAN STREET BRIDGE, INDIANAPOLIS, SHOWING CONSTRUCTION OF FACING.

for its purification, the expense is $1.42 per million gallons, but the amount of coagulant varies with different waters, sometimes being several times the amount here represented. Ordinarily the expense of pumping water under sixty pounds pressure does not exceed four cents per million gallons for each foot it is lifted. Three per cent. of the filtered water for washing is undoubtedly sufficient, or 30,000 gallons per million

There are several engineering problems connected with filters, as well as the matter of interest on sinking fund, that should be carefully considered before selecting any filtering process. The best system, including its efficiency and operating expense, should always be determined by preliminary experiment before any plans for improvement are adopted by a water-works company or municipality.

IMPROVEMENTS OF TRAFFIC CONDITIONS IN BOSTON.

We present four pictures this month to show the improvement in the conditions about the new terminal station whereby greater facility is given for the traffic to and from the freight and passenger stations and to and from South Boston, which is here concentrated in a small area formerly served by narrow and crooked streets without proper outlets. One picture shows the express and freight houses on the Atlantic avenue front of the terminal station. Federal and Cove streets formerly occupied this ground. A bridge to South Boston in extension of this street is urged. The advantage of a wide and straight street in preventing congestion is clearly shown. Dorchester avenue, in the rear of the station, is shown in the second view. This is a new street with sea wall constructed to take the place of Federal street and to give a thoroughfare to South Boston. A third view shows the corner of the terminal station at Dorchester avenue and Summer street. Summer street has been widened and rebuilt at this point and at the entrance to the new Summer street bridge, which has been open to traffic for a year. It would be impossible to conduct the present business in this district and that which must pass through it, without the radical reconstruction which the present condition demonstrates to those who have ever visited the district when it was laboring under the difficulties of narrow and crooked streets and bridges.

Another improvement of magnitude is the new Charles river bridge, shown in the fifth view. It replaces a bridge which was built in 1786, and is now to be torn down. This is shown in the view, and a comparison of the two bridges shows the advance in the science of bridge construction as well as the necessity of increase in facilities for traffic.

THE AMERICAN CEMENT INDUSTRIES.

The development in the United States of the manufacture of cements, especially of more or less strictly artificial or Portland cements, has been phenomenal in its extent and rapidity in the past ten or fifteen years, and especially so in the last five or six years. MUNICIPAL ENGINEERING has paid the large amount of attention to cement and its uses which so important a material in engineering construction demands, and has been in the advance column in its presentation of the demonstration of its value in the many new uses to which it is put. A department devoted to cement was carried on by an expert in its inspection and use until the subject outgrew the limits of a department and extended through all sections of the magazine. The commercial test is a valuable test and doubtless the most popular one. Measured in this way, the service of the magazine has been eminently satisfactory, for the advertising pages show a steady and rapid increase in the amount of space occupied by the manufacturers and sales agents of Portland and natural hydraulic cements.

The publication of several books upon natural and Portland cements, and the increased space given these materials in books on the materials of construction, are additional signs of the growing importance of the material in engineering construction.

The industries to which this increased use of cement has given rise have found the need of a book which shall be devoted especially to the subject of cement, and which shall cover the whole subject as far as it has been developed. This want, and the facilities which this magazine has for satisfying it, have forced the management to the conclusion that it should undertake the publication of such a book. Its preparation will be in charge of the editor of this magazine.

There will be two principal divisions in the book, one a directory of the industries connected with the manufacture, sale, and use of cement, and the other a hand-book for the cement user.

In the first division will be a list of the manufacturers of cement; a classified list of the various brands of cement on the market, American, Portland, and natural hydraulic and foreign Portland cements, giving the names of the manufacturer of each brand; a list of the names and addresses of the general sales agents and the companies they represent; a list of the dealers in cement in cities and towns throughout the United States and Canada; a classified list of those interested in the use of cement, whether architects, engineers, contractors or cement workers; a list of the cement testing and analyzing laboratories, governmental, municipal or private; lists of the

FREIGHT AND EXPRESS BUILDINGS ON ATLANTIC AVENUE FRONT OF NEW BOSTON TERMINAL STATION.

makers of machinery for the manufacture and the manipulation of cement. This directory is something which has never before been attempted, and the greatest care is taken to make it accurate and extensive enough to cover fully the field described.

The hand-book is a text-book upon the manufacture and use of cement, which will contain a large amount of information for all those whose names will find a place in the directory, and in addition to engineers, contractors and other persons who use small quantities of cement, or who are considering its use in their work and in preparing specifications for the same.

There will be a brief sketch of the cement industry in this country, a statement of the principles upon which the various processes of manufacture are based, brief descriptions of the cement factories and their methods of manufacture so far as the officers are willing to have them published, tables of chemical analyses, and the results of tests of quality. Standard methods of testing and specifications for testing cement of the various kinds and for various duties required of it will be given in detail. An important feature for the cement user will be full specifications, or descriptions of methods, for the use of cement in all classes of building and engineering construction; mortar for brick and stone masonry; concrete for many various purposes, that for which natural cement is used and that for which Portland cement is used; concrete piers and abutments; cement mortar for plastering cellars, cisterns, walls, piers and abutments; street foundations; cement sidewalks; building foundations; etc., etc. This section will be made as complete as possible, that it may contain the best methods of doing work of all classes and specifications for the construction of the same, which are now scattered through books, engineering and trade periodicals, trade publications, engineers' specifications for municipal and other public work, railroad and architectural construction and the like.

The result will be a book containing a large amount of information and instruction concerning the manufacture and the manipulation of cement, for every person interested in cement in its progress from the quarry, marl bed or slag pile to its place in the completed structure. The directory features add very largely to the engineering interest, giving the business standpoint and full information to the consumer as to where to get the cement desired, and to the producer as to where to sell the product he manufactures.

Cement making machinery and machines for handling cement and concrete in engineering work will have a prominent place in both directory and hand-book. This is another branch of the subject in which this book is a pioneer.

In short, the book is expected to fill the expressed needs of the cement and allied industries, to collect the best information and instruction extant within its covers and to give some new classes of information, especially in its directory, which have never before been attainable in any form whatever.

EDITORIAL COMMENT.

Street Cleaning Specifications.

The consequence of difference in conditions and in specifications for street sweeping and cleaning is shown by the difference in the bids for this year's work in Indianapolis and in San Francisco. The former city has been noted for some years for the cleanliness of its streets, and will pay this year 18¼ cents for sweeping and removing the sweepings from each 10,000 square feet of space. Extra amounts are allowed for day hand labor in small quantities as ordered by the board of public works. San Francisco is making a strong endeavor to relieve itself of the dust and mud nuisance to which it is so subject, and has prepared a very elaborate specification for street sweeping and cleaning under which the contract has recently been let for 1901. First-class streets in District No. 1 are all cleaned by day hand labor every day except Sunday at a contract price of 77 cents for 1,000 square yards, equivalent to 86⅛ cents for 10,000 square feet or nearly five times the cost in Indianapolis. Streets of other classes in this district are cleaned at night by machine, some every night, some three times, some twice, and some once each week, and a few once in two weeks. The contract price for these streets is equivalent to 76⅔ cents for 10,000 square feet.

The price for District No. 2, all classes, is equivalent to 43.6 cents for 10,000 square feet. The various classes of streets in this district are swept once a day, twice and once a week, once in two weeks, once a month.

Some statement of the requirements in San Francisco will be of interest. Hand

DORCHESTER AVENUE AT REAR OF NEW BOSTON TERMINAL STATION.

labor must all be done in the day, except on the most crowded streets. Machine work must all be done at night. Reductions in schedule can be made for lack of money to pay for the work, but the contractor will receive forty per cent. of the contract price for the amount of work taken off, provided he leaves the streets as clean after each sweeping as though the number of sweepings had not been reduced. The contractor must notify the board each morning of the routes of his cleaning gangs for the following night and the next day. Dust must not fly during sweeping under penalty of fifty cents for each block in which it is caused to rise. Sweeping contractor must sprinkle if the street is not kept sufficiently moist by the sprinkling contractor, if any. On streets of the first class the contractor must keep sidewalks clear of papers, etc., except sweepings from stores. The minimum number of men to be employed on certain of the first-class streets is prescribed in detail. Enough more must be employed to keep these streets clean at all times. Reductions in payment for deficiencies in number of men are provided for. When work is suspended on account of rain or otherwise, the payment per hour for the time spent on the streets will be one-eighth of the amount allowed per day for full time. When conditions require it, in the opinion of the board of public works, the asphaltic pavements must be flushed by sprinkling carts at an extra charge of $1 an hour for each cart, including teams, driver and water. The streets so flushed must be scraped with rubber scrapers by the regular force without extra charge. Streets broken or under repair will not be swept or paid for. In rainy weather at least thirty-five men must be detailed to keep cross walks clean at an extra price of fifteen cents for each walk so cleaned, provided the work on the walk is begun before 1:30 P. M. At least 450 dirt receptacles must be furnished of specified character, also all machinery and tools. Sweepers wear white uniforms, paid for by them at $2.25 each. Special crews of team, driver, wagon and three laborers for cleaning gutterways and crossings, according to schedule and specific orders, are provided for at an extra price of thirty cents an hour for each laborer, and fifty cents for team, wagon and driver. Not more than twelve laborers are to work on holidays and Sundays from 6 to 10 A. M., at an extra cost of thirty cents an hour for each man. Four dumping districts are specified. Sweepings from any one of these districts are to be dumped at any specified place within that district. Any load diverted from the place required subjects the contractor to a fine of $1.

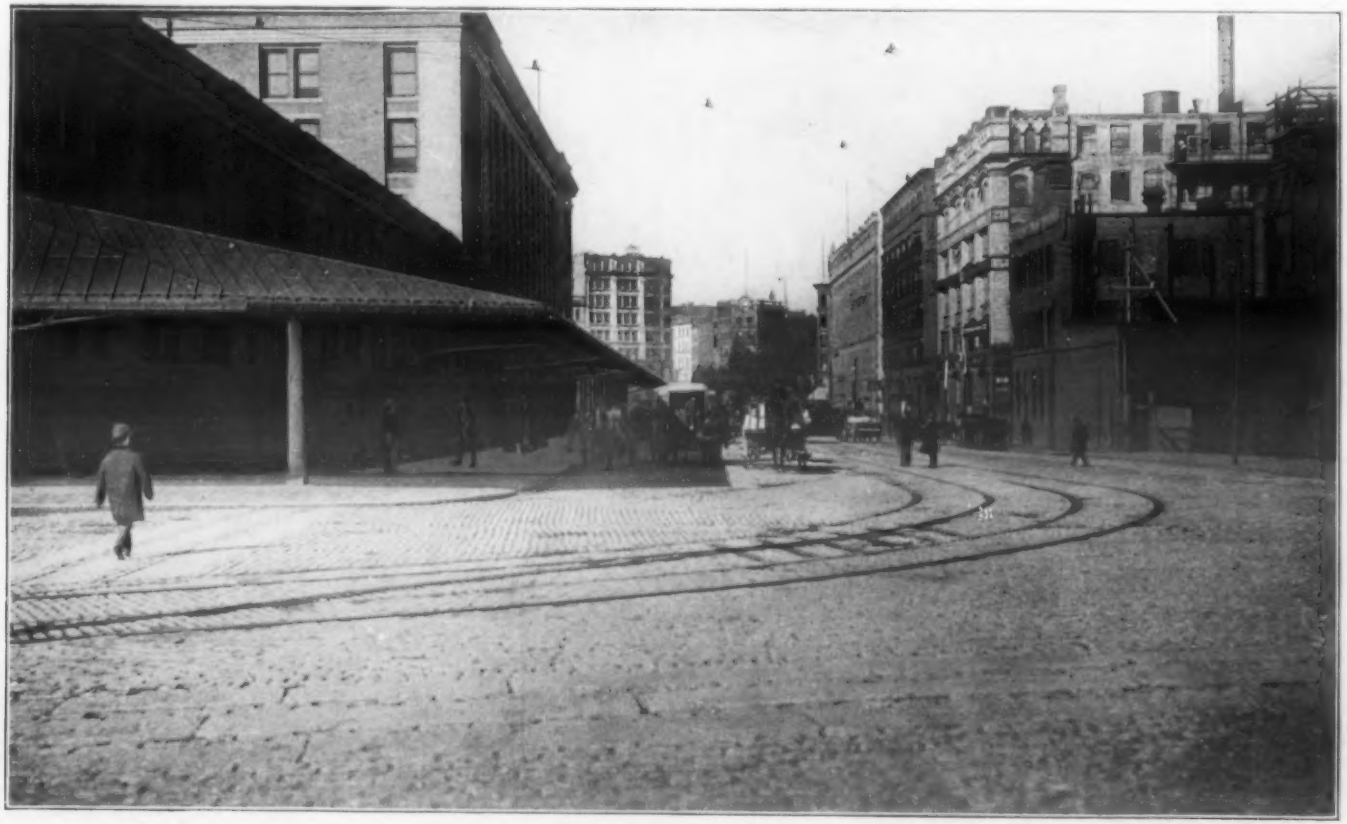
Wages are fixed at $2 for an eight-hour day, payable twice a month, without commission or retention of more than one day's pay. Contractor may board teamsters at 50 cents a day, and furnish room at 15 cents a day. He can not do this for other laborers.

Reports of cleaned streets are made at specified times, inspection is made, fines deducted, and payment is made monthly.

The Indianapolis specifications are simply to keep the streets clean to the satisfaction of the board. If street car tracks are bouldered they must be cleaned once a week; if graveled, they must be sprinkled enough to keep the dust down at all times. Various classes of streets are swept four, three, two and one time a week, by machine at night. Hand labor may be required during the day for streets selected by the board, and will be paid for, extra, at $1.35 a day for labor; $2.50 for horse, cart and driver; $3 for two horses, wagon and driver; $4 for 2-horse scraper and driver; $5 for four-horse scraper and driver.

Vitrified Pipe for Water Conduits. The paper presented before the Connecticut Civil Engineers' Association, upon the vitrified pipe conduit of the Hartford waterworks, by W. E. Johnson, selections from which are presented elsewhere in this number, gives in full detail the method of using this material for water supply mains. There are a few lines of similar pipe scattered about the country, which seem to give excellent satisfaction. One peculiarity about their use is that they have been adopted by towns whose sources of supply are located in rather rough country where the problem of location of a line with a uniform gradient is difficult of solution. The one described seems to have been satisfactorily worked out.

A very detailed specification of prohibited defects in pipe is a part of the original paper. Too much trouble can not be taken in this regard if the expected results are to be reached and the pipe line is to continue in use without frequent repairs. The result of this care is shown in this instance by the observed discharge of the pipe, which is over thirteen per cent. higher than that computed. Reduction in flow to any marked extent by deterioration of the inner surface of the pipe is not to be expected, as is usual with iron pipe, and the conduit will probably be easier to clean than one of iron and will not need it so frequently.



BOSTON TERMINAL STATION AT CORNER OF DORCHESTER AVENUE AND SUMMER STREET.

There is one detail of construction mentioned and shown in the photograph which accompanies the article, which is of interest, and the effect of which should be carefully observed. Instead of forming the bottom of the trench and compacting it so that the pipes will rest for their full length upon the ground, the bottom was excavated slightly below the grade line and saddles made of strips of two by four by fifteen inch blocks were firmly imbedded in the soil at intervals of three feet (the length of a pipe) and these serve to support the line. It is stated that the soil is underlaid by rock quite close to the surface, and in some cases rock excavation was necessary. The query which suggests itself is whether the concentration of the weight of the pipe upon these supports will not cause a greater variation in settlement than a careful preparation of the bottom, and thus increase the possibility of leakage at the joints and breakage of bells or of pipe bodies. Reports upon such details as this seldom find themselves into print. Some report of the action of the conduit at Amsterdam, N. Y., has been made, as well as of its method of construction, and when this conduit requires inspection a similar report should be made. The Amsterdam conduit was laid more nearly according to the usual method of laying sewer pipe, more care being taken with the joints, so that leakage was reduced to a minimum.

The Agitation for Municipal Ownership

One of the signs of the widespread interest in the consideration of the question of municipal ownership and operation of public service utilities is the selection of some form or some branch of the subject for debate by college and school societies and for intercollegiate debates. The state normal schools seem to be closer to the people and more nearly representative of the tendencies of thought of the solid body upon which depends the continuity of our institutions. If this is so, it is evident that the people who have the final decision are searching for light upon this important matter, for in some phase it is among the most common subjects for debate, and for essays and orations as well.

The subject of the interstate debate among state normal schools in states around Iowa for this year inquires whether it is advisable to turn over to the cities, immediately and unconditionally, the management of such business as tends to become a monopoly. Such a form of the question as this seems quite impossible to those who have been studying the question most seriously, and is especially unfortunate for discussion by those who are getting their first idea of the subject. It is in form to give good play to the forensic ability of the contestants, to give the prize-ring flavor to the debate which so often appears, but it is hardly possible for the best informed debater with the true spirit of search for the truth to give any adequate idea of the subject. In fact, the question can not be debated upon its merits. What is possible in one city is altogether impossible in another. What can be tried with some hope of success in one city is doomed to certain failure in another. On the principle of suffering the ills we have rather than fly to those we know not of, the general question would be answered in the negative: but progress would be delayed in a number of cases by applying this answer. Like most of the questions of the practical application of theoretical conclusions in this field of municipal ownership and control, this one can not be answered with any satisfaction in its general form, but the local conditions and tendencies have a very large influence in making the decision.

It is quite possible that the discussion of questions in such form as this delays to some extent the logical development of the subject. Both sides, in such a debate, are very likely to be wrong in the principle upon which their contention is based, and are quite sure to turn their arguments from their legitimate channel to make them the most telling for the present purpose. Immature judgment often fails here, and injury is done the cause in the minds of the hearers who are not students of the subject. Prejudices are thus aroused which long prevent the minds of participants and hearers from listening to proper presentations of legitimate arguments.

A similar criticism has been made of some discussions in national societies formed to consider municipal matters, but more mature judgment, more information and continued study have opportunity in such cases to correct the errors made in the early stages of the discussion.

Public Lighting Symposium.

It has been suggested that one statement made in this department last month might be construed as questioning the accuracy and honesty of the articles usually appearing in the pages of Municipal Affairs, the quarterly publication of the committee on city affairs of the New York Reform Club. A careful reading of the sentence in question will cor-

NEW SUMMER STREET BRIDGE, BOSTON. NEW BUILDINGS FOR WOOL TRADE AND RAILROAD TERMINALS BEYOND.

rect such a misapprehension. The tone of the discussions which appear in that periodical is so temperate, and the arguments favoring the positions assumed are so carefully made that anything which appears in its pages carries more than usual weight. It is the medium for much of the best work of those prominent and influential in promoting desirable municipal reforms. Its reputation for strength and for trustworthiness is therefore unassailable.

This does not, however, cause a modification of the statement that the conclusions drawn are not always strictly reliable on account of the practical impossibility of taking full account of all the circumstances of every case. Thus it would not be safe to apply the average result of municipal ownership in England, as stated by Mr. Maltbie in his paper on "Gas Lighting in England," to any particular city in that country which is proposing to "municipalize" its gas plant, with the expectation that that result would be realized in the new application. There are many personal and local peculiarities which materially modify the details of the development of such a project. The fundamental theoretical principles are the same, but custom, personal preferences, political conditions, all have their important parts in preventing the complete and successful application of these principles. One of the circumstances which has not received sufficient emphasis in this paper is the number of failures which have occurred in municipal operation of such plants. The conditions which bring about such failures should be studied and stated as a guide to those under similar conditions and a warning of the difficulties to be encountered. The reports of failures are much more important than those of successes. While, therefore, the conclusions reached in the paper may be drawn very properly from the data given, they are not entirely reliable for application to any particular case on account of the possible omission of some very important modifying circumstances. Still less could the conclusions be applied directly to cities in America.

Again, in Mr. Fairlee's discussion of "Municipal Lighting in Detroit," the argument depends very largely upon such items as the percentage to be charged for deterioration of plant. The assumption of a different percentage from that given in the paper would materially modify the conclusion as to economy of municipal operation. A complete discussion from data of practical construction, maintenance and operation has never been made. Until it is made, any conclusion drawn from the comparison of data into which this item enters can not be thoroughly reliable. There are great differences of opinion among experts upon this subject, and it is one which is under constant consideration. Data upon which to base reliable conclusions are accumulating and will be considered as opportunity offers. In the meantime assumptions of percentages of loss must be accepted with caution.

The use of the words, "not reliable," was not intended to convey any hint of dishonesty of purpose in collecting or discussing the data offered. The introduction of the word into the English language is too recent for it to have degenerated, as words do, and to be restricted to its least honorable meaning. The intention was to express the fact that summaries of statistics, averages of conditions and conclusions drawn from such summaries and averages can not be relied upon as a safe guide for any particular application. Better direction is almost always found in reports of particular cases under similar circumstances, with such modifications as the results of the general discussion indicate to be advisable.

Uses of Portland Cement Concrete.

A large majority of the railroad superintendents of bridges and buildings use Portland cement concrete in important work. Thirty-three of the replies to the report of the committee of their association describe the character of the structures in which Portland cement is preferable. The division between the use of natural and of Portland cement is usually made with care, and the average rule is quite safe for builders of such structures to follow.

Half of those sending answers use Portland cement in both foundations and neat work of bridge piers and abutments. Two use it in foundations only. A few use Portland cement in concrete above ground and natural cement below, the exact line being drawn in one or two cases at two feet from the weather.

Portland cement is used in all classes of foundations by eleven roads, in culverts by ten, in arches, both foundation and neat work, by six, in retaining walls, both foundation and neat work, by eight, in the foundations only of arches and retaining walls by one. Other classes of structures in which its use is mentioned are pedestals, copings, facing and repairing old stone masonry, dams, cylinder piers, facing decaying stone ledges, salt water foundations, wet foundations and those where loading is excessive, engine beds, cement floors, walls up to water table, etc.

NEW CHARLESTOWN BRIDGE, SHOWING ALSO THE OLD BRIDGE OF 1786, WHICH IT SUCCEEDS.

The statement of one engineer seems to cover the general custom, namely, that Portland cement concrete is used in lieu of rubble stone masonry. It is also used in place of brick work by some, and the interior and underground portions are made with natural cement by a few. Several use Portland cement concrete in place of almost all stone masonry, both hearting and face work.

Proportions of materials used vary with the strength required, the exposure and the opinions of the superintendents. In but one case do more than two men report the same mixture. Seven report the proportions for foundations at approximately one part Portland cement, three parts sand and six parts broken stone. The corresponding popular mixtures for natural cement are one, two, and five or six respectively.

One part Portland cement, one part sand, and two parts fine broken stone, is used by one road for copings and bridge seats.

One part Portland cement, two parts sand is used by one for parts receiving direct pressure from superstructure. Four parts of stone are added for arches, coping bridge seats, pedestal stones, facing old masonry, foundations; one or two increasing the amount of stone to five parts, and one or two increasing it for foundations to six parts.

A mixture of one part of Portland cement and two and one-half parts of sand is used for neat work, arch rings and parapets, with five or six parts of stone, and in one case three parts of gravel and four parts of broken stone.

A mixture of one part of Portland cement with three parts of sand is most popular. It is used neat for outside shell and coping by one, with four or five parts of stone by others. Nearly all use either five or six parts of stone with this strength of mortar, two or three increasing the amount of stone to seven parts, and one to seven and one-half parts for ordinary wet foundations and culverts. The proportions, one, three and five or six, probably agree most nearly for the stone used with the requirement that the sand should be just sufficient to fill the voids in the stone, and the cement is in sufficient quantity to develop all the strength of masonry needed.

Two persons use one part cement and three and one-half sand, with six to eight and one-half parts of stone for foundations of light buildings and culverts. Four persons use one part cement and four parts sand, with seven to ten parts of stone for similar purposes. Except for the largest proportion of stone named these proportions again correspond quite closely with the requirement named, the smaller proportion of cement giving a concrete with less strength, but doubtless sufficient for the duty required, and therefore following good engineering practice. The committee states the requirement in this form: "It is our individual opinion that the proper procedure is by careful study and experiment to determine the cement and sand mixture giving the requisite strength for the work in hand, and then to add broken stone in such quantity that the mortar will be slightly in excess of the voids in the stone. The New York Central Railroad uses one cement, four sand, seven and one-half broken stone with rubble fillers for footings; one, three and six respectively with rubble fillers for abutments; one, two and four for facing old masonry; one, one and two for coping and bridge seats. A similar variation in proportions for similar uses is made by other roads.

ANSWERS TO QUESTIONS.

HEATING POWER OF NATURAL GAS.

Where can I obtain information on the heating energy of Indiana natural gas as compared with that of a ton of coal.

Oliver H. Bogue, City Attorney,
Wabash, Ind.

The twenty-third annual report of the state department of geology, for the year 1898, gives some information on this point. One pound of average Pittsburg coal yields 13,066 B. T. U. One pound of average Indiana coal yields 12,382 B. T. U. One cubic foot of natural gas yields 1,164 B. T. U. One British thermal unit (B. T. U.) is the amount of heat necessary to raise one pound of water one degree Fahrenheit in temperature.

Theoretically, therefore, one pound of Pittsburg coal equals 11.2 cubic feet of gas and one pound of Indiana coal equals 10.6 cubic feet of gas. Practically, the report states, one pound of Indiana coal is equal to 10 cubic feet of Indiana natural gas.

Mr. Alton D. Adams states in his article on "Public Gas Supply," on page 384 of the number of MUNICIPAL ENGINEERING for December, 1900, that one cubic foot of natural

gas yields 1,000 B. T. U. This is a convenient figure for ordinary comparisons.

DESIGN OF HOUSE DRAIN.

What is considered to be the proper size for vitrified pipe house drains? What should be the minimum grade? I have established a minimum grade of 2 per cent., but have been obliged to use 1.5 per cent. in some cases to drain wet cellars.

Is there any objection to connecting cellar drains with house drains, providing connection is made through a trap with backwater valve, or by draining water to a brick basin and trapping with a bend in the outlet pipe which dips well below the surface of the water in the basin? It is very essential that all ground water be drained away from fresh air ducts of furnaces. I have found them entirely closed with ice, and in other cases a foul odor was noticed in the house when water collected in the duct.

Subscriber,
Great Falls, Mont.

The size usually selected for vitrified pipe house drains is 4-inch. Experience indicates that under the same conditions of ordinary house service pipe of this size is less liable to stoppage than that either larger or smaller. If there is a large amount of water used in the house, or if it is a large double house, the pipe should be enlarged. If the amount of roof-water is likely to be large on account of large roof area and heavy rainfall, a larger pipe may be desirable. The gradient for a 4-inch house drain is usually given as at least 2.5 per cent. The amount of water used and the frequency of flushing discharges from water closets, tubs and the like, modify this statement. If the gradient must be much below 2 per cent. it will be advisable to make the line easily accessible, by means of a manhole or clean-out chamber, and to arrange connections so as to insure the full effect of all flushing discharges. A connection in one house on a low gradient may run indefinitely without stoppage and one in the next house be subject to frequent stoppages, the difference being in the habits of the occupants of the houses regarding matter discharged into the sewers, amount of water, frequency of flushing, use of chemical cleaners, etc.

A cellar drain trapped as suggested should give satisfaction, except when a continued dry season cuts off the supply of water long enough to allow evaporation of the water in the trap. The basin must be water-tight so that it will not lose the water by leakage at such times, and the surface of water exposed to the air should be as small as possible, that evaporation may be reduced to a minimum. A vitrified clay or protected iron basin may be better than one built of brick. It should have depth rather than large diameter.

BOOKS ON PLUMBING AND SEWERAGE.

I want some information as to recent books on house plumbing and connections with sewers. We have just completed our system of sewers and this office must superintend the connections.

Geo. W. Carpenter, City Engineer,
Watertown, S. Dak.

The last edition of Staley & Pierson's "Separate System of Sewerage" ($3) and Folwell's "Sewerage" ($3) both contain much of value in the actual work of constructing such connections as well as in designing them. Books on plumbing, with the sewer connections as a part of the house system, are Gerhard's "House Drainage and Sanitary Plumbing" (50 cents), and "Recent Practice in the Sanitary Drainage of Buildings" (50 cents); Coleman's "Sanitary House Drainage, English Practice" ($2); Waring's "How to Drain a House" ($1.25). For the engineer's purposes their relative value is probably in the order they are named. See also "Design of House Drains" in this department.

JOINT USE OF SEWER CONNECTIONS.

In some cities the ordinances regulating sewer connections require that each building shall be separately and independently connected with the lateral sewer. The laterals in our city are all in the alleys at the rear of lots facing on the avenues. Quite frequently two dwellings are built on one lot, and occasionally a row of houses is built on two lots, the houses facing the street running at right angles with the avenue, which makes the connection of several houses with one main drain desirable, if not absolutely necessary. In the construction of house drains, solid and shale rock is frequently encountered, and the extra length of trench in making separate connections makes them quite expensive, especially when it is necessary to drain wet cellars seven or eight feet deep. What are the objections to the joint use of house connections aside from the fact that a change of ownership may complicate matters, and can this objection be overcome?

Subscriber,
Great Falls, Montana.

In some cities it is customary when sewers are laid in streets, to run a single connection from the sewer to a point inside the curb line for each two lots, opposite the line between them, placing a Y at the end so that each of the property owners can make connection without running to the sewer. These lines from sewer to curb being put in with the main sewer, the cost of making connections is materially reduced. The only trouble which can arise is as to the responsibility for any stoppage which may occur in the joint part of the connection. These are not frequent and can be cleaned out from the sewer, unless the separate system with its small sewers is in use. There may be occasional small controversies in such cases. With sewers in alleys these double connec

tions are not necessary unless there are the exceptional conditions mentioned.

There should be a city ordinance regulating connections with sewers and requiring the approval of the city engineer or board of public works for the portion of a house connection outside of the buildings, as well as the approval of the building or the plumbing inspector for the house system. This will enable those responsible for the sewer system to have the connections made in the best manner possible in each particular case and reduce to a minimum the number of cases where future controversies may arise. Some cities have ordinances and regulations regarding the connection of private sewers with the public main sewers, and regarding additional connections with such private sewers, which have been prepared to cover the conditions arising when a new public system is constructed where some private sewers are already in use. Some of the provisions of such an ordinance would be of value in this case. 1. If the sewer, upon inspection by the city engineer, is satisfactory it may be adopted by the city as a branch sewer and placed under the same regulations regarding connections with it, methods of cleaning and paying for the same, etc. This can not be done unless at the same time the city is given right of way, which is duly recorded, for purposes of taking care of the sewer, and should not be done unless a manhole or flushtank or a lamphole and flushout pipe is put at the end of it. 2. The original owner of the sewer may be permitted to connect with the city sewer provided he will accept the requirement that he keep the sewer clean so long as he owns any portion of the property, and the obligation is transferred with the deed to some definite portion of the property. In such cases there should be a provision that additional connections can be made, up to the capacity of the sewer, by other persons along the line, provided payment is made to the owner of the sewer of a proper sum for such connection. All such connections must be approved by the city engineer, and in case the amount to be paid for the privilege of making the connection can not be agreed upon, the city engineer or board of public works should be required to fix the proper sum after consideration of the special conditions in the case.

Such regulations remove very nearly all the chances for trouble, and if the city engineer is made the responsible party to make the decisions in contested cases, the cases of serious controversy will be exceedingly few.

STREET SPRINKLING WITH SALT WATER.

I desire some information regarding the best methods of street sprinkling with salt water. Does the salt damage certain classes of goods exposed for sale in places of business?

C. H. Topp, City Engineer,
Victoria, B. C.

The street superintendent at Oakland, Cal., will be able to give some valuable information upon this subject. San Francisco has also had some experience. So long as the streets are kept damp, so that the dust will not fly, there can be no damage to goods. Salt in the dust would probably have an effect somewhat more injurious than the ordinary dust. If the streets are kept clean and accumulations of dirt and dust worn from the wearing surface of the softer pavements, such as macadam, are promptly removed, this trouble will be reduced to a minimum. Rain storms will wash the accumulations of salt away from clean streets whose drainage is properly taken care of. Salt water has more effect in laying dust and keeping it moist than fresh water.

TARRED MACADAM PAVEMENTS.

I wish to get what information is available regarding the building of tar and gravel street pavements, cost, method of laying and results. Can you refer me to some engineer who has had some experience?

Eug. L. Willard, C. E., St. Mary's, Pa.

The most serious attempt at experiment on this sort of pavement is that at Hamilton, Ont., where a sufficient length of pavement has been laid to give a good idea of the possibilities of the method. Descriptions of the pavement, giving method of laying, components of the pavement and reports from observers of the success attained, will be found in the last volume of MUNICIPAL ENGINEERING on pages 283, October number, 362, November number, and 423, December number. The city engineer of Hamilton will doubtless be willing to make a statement of his opinion regarding the pavement. Broken stone, filled with sand, was used in this case, but it is probable that a proper mixture of sand and gravel would be equally satisfactory.

MACADAM FOR SMALL CITY.

We want information regarding the cost, lasting qualities and value of macadam pavements, as a basis for consideration of the matter by our city council, which can proceed to construct, under the Barrett law, if the business men can interest them in the matter.

H. M.,
Connersville, Ind.

The pages of MUNICIPAL ENGINEERING MAGAZINE are good sources of information.

Among recent articles are, "Tar Macadam," on pages 283, 362, 423; "Sandstone for Macadam," on page 25, and "Initial Steps in Getting Good Roads," on page 1, Vol. XIX, July–December, 1900. "How to Construct a Macadam Pavement for Heavy Traffic," on page 168; "How Fine Should Macadam Stone be Crushed," on page 35; "Road Making in Massachusetts," pages 330, 332 and 333, of Vol. XVIII, January–June, 1900. "Macadam for Streets," very closely fitting this question, on page 80; "Importance of Drainage in Making Good Roads," page 216, of Vol. XVII, July–December, 1899; "Scientific Road Construction in Massachusetts," page 256; a list of previous articles on the subject on page 245 of Vol. XVIII, January–June, 1899.

Good books on the subject are Spalding's "Roads and Pavements," and Byrne's "Highway Construction."

Estimates of cost and opinions as to the most economical method of construction can not be offered without knowledge of local conditions, proximity and cost of material of different kinds, etc., best made by an engineer or a man with much experience in building and repairing roads.

THE TESTS FOR PAVING BRICK.

What are the constituents of a good vitrified brick, chemically?

To what processes of test should brick be subjected if several different kinds are to be compared?

Would subjecting them to an absorption test and the attrition of heavy wheels be sufficient?

J. M. Bandy, City Engineer,
Greensboro, N. C.

The chemical constitution of a finished paving brick is not usually determined, the variation in proportions of material being rather too large for accurate comparison of bricks, and other methods being much more satisfactory and more easily applied. Johnson gives "the average composition of the shales that have proved eminently satisfactory for making paving brick" as follows:

Silica ($Si\ O_2$), 56; alumina ($Al_2\ O_3$), 22; ignition loss (chemically combined water), 7; moisture ($H_2\ O$), 2 per cent.; total non-fluxing constituents, 87 per cent. Sesquioxide of iron ($Fe_2\ O_3$), 7; lime ($Ca\ O$), 1; magnesia ($Mg\ O$), 1; alkalies ($K_2\ O\ Na_2\ O$), 4 per cent.; total fluxing constituents, 13 per cent.

The full programme of tests includes cross breaking, crushing, the rattler test and absorption. There is some difference of opinion as to the relative value of these tests, but the limitations of the ordinary apparatus of the city engineer usually reduce the number to the last two. The standard rattler test is more satisfactory than any attempt to subject the brick to any approximation to the conditions of traffic. It subjects all the brick in the rattler to the same impact and attrition and thus produces results which are fairly comparable. The conditions should approach as nearly to the following as possible in order to make comparisons with results obtained by others, but for local use some variation can be made if circumstances require: A rattler 28 inches in diameter and 20 inches long; 75 pounds of "shot," cast iron blocks $2\frac{1}{2} \times 2\frac{1}{2} \times 4\frac{1}{2}$ inches with half-inch round edges; 225 pounds of similar shot, $1\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{2}$ inches with rounded edges; not more than 12 brick; 1,000 revolutions at a speed of 20 to 30 revolutions a minute. The absorption test must be made on broken brick or on those which have been subjected to the rattler test. For the greatest accuracy, they should be thoroughly dried before immersing in water.

These two tests, if the brick under study is compared with one which has given satisfaction in pavements, are usually considered sufficient, though some experimenters insist upon the cross breaking test as one of great value.

VEGETABLE GROWTH IN WATER PIPES.

Ordinarily we get our water supply from tube wells about 45 feet deep, but during the past season, owing to large improvements being made we have taken a great amount of water from an open well in order to keep the water down and away from the pump and building foundation which are being built. The water entering the pumps, either by direct suction or from the open well, appears very clear and free from sediment, but after entering the mains and in certain sections of the city, especially in the center of the city, we are having trouble with a peculiar substance which shows traces of spores and a fungus growth. We have never had anything that has affected the water just the same as this before this time; I can add that for the past two years we have not used the open well very much, having taken direct suction from the tube well system; this may have had some effect on the water, as well as an unusually dry season—the average deficiency in rain-fall being about 11 inches. Our pumping since this was noticeable has been an average of about 6,500,000 gallons daily at a domestic pressure of 60 pounds, and the large mains show little effect of the trouble. Having recently become a subscriber to your magazine, we take the liberty of asking if you can enlighten us as to the cause of our trouble, and if so, have you any remedy? We have flushed the pipes very heavily recently, and that has very materially helped the matter. Is it possible that this is a growth formed in the pipes? Any information that you or your subscribers can give on the subject will be appreciated.

Chas. E. Rowe, Secretary Water-Works,
Dayton, Ohio.

It is evident that the temporary supply used was infected with some of the plant life which gives trouble by its growth and subsequent decay in the pipe system. Among

these organisms some varieties of fresh water sponges and crenothrix are perhaps most common and most likely to be the causes of the present trouble. That the trouble is of this nature is indicated by the fact that it does not occur in the larger supply pipes where the current is swifter and more nearly constant, but in the smaller distribution pipes where the current is more intermittent and less rapid except when pipes are flushed in case of fire or for cleaning them.

The exact nature of the organism producing the trouble can be determined by the water biologist upon careful microscopical examination. This knowledge, with information of the chemical properties of the supplies of water available, will aid in forming a judgment as to the treatment necessary to reduce the trouble if not entirely eradicate it. In the meantime systematic flushing of the pipes in which the trouble occurs will keep it within bounds. It is possible that the return to the former source of supply will shortly cut off the supply of food for the organisms, at least in part, and thus reduce their numbers. These organisms, however, find much food in ordinary ground waters, and once introduced into the pipes may remain to give trouble constantly or intermittently.

Perhaps some of our subscribers will be willing to send in reports of their successes and especially of their failures under similar circumstances.

RATE OF WATER FILTRATION AND AMOUNT OF COAGULANT NEEDED.

In an excellent article by Mr. Floyd Davis, E. M., Ph. D., on "The English System of Water Filtration," published in your December number, 1900, page 394, Mr. Davis gives "head of water, between unfiltered and filtered, from a few inches to about 80 inches, as giving good results." Now, even if the flow through the filtering medium increased only in direct ratio to the head, and assuming the "few inches" as 8 inches, while the greater head is 80 inches, the rate of filtering might for the 80-inch head be ten times as great as for the 8-inch head; but if the flow through the sand increases as gravity or as the square of the depth or head, the velocity might be not only 10 times as great but 100 times or less, depending on the thickness, fineness and consequent retardation of the filtering medium or obstacle to its free flow through space. Such differences of velocity could hardly give uniformly good results. Will Mr. Davis be kind enough to state in your next issue what is the rate of flow due to a head of, say, 8 inches through a given thickness of material and what that due to a head of 80 inches through the same stratum.

I am led to make these inquiries, as Mr. Hazen, in a recent article in the *New York Engineering Record*, published a tabular statement for mechanical filtration for some twenty-eight cities, differing in population from 5,000 to 300,000, and from which I have calculated the ratio of filtration per square foot of filtering bed or area to differ by from 1 in 5 to 1 in 60 of the population, which would seem to indicate in some cases too small a velocity to insure an adequate supply, or too great a velocity to allow of proper quality. A communication of mine in the premises, followed by an answer of Mr. Hazen, appeared in the last issue of the same journal, to which I beg to refer Mr. Davis as further illustrative of the result I desire to arrive at, as Quebec is just now agitating the question of filtering its ten million gallons daily supply of water, and may find it advisable to see as to which is the preferable of the two systems: the supposed-to-be comparatively slow process of European filtering through extended areas, or the quicker mechanical American process through lesser areas.

I would also ask Mr. Davis for an approximately accurate interpretation of what is meant at the beginning of his last paragraph, page 396, by the words, "The aluminum sulphate in solution is added in *small amounts* to the water as it flows to the settling basin." Will Mr. Davis please state what ratio or percentage this *small amount* should bear to the quantity of water, or is this to be arrived at by experiment, and as due to the greater or less turbidity of the water?

Mr. Davis may be assured that his answers to these questions will be highly appreciated by the readers of this valuable medium of information, MUNICIPAL ENGINEERING.

C. Baillairge, C. E., Quebec.

This question was referred to Mr. Davis, and his reply, on account of miscarriage by mail, was received too late for the January number. It is now presented, as follows:

"I have read with much interest the letter of Mr. C. Baillairge, C. E., of Quebec, requesting additional information on a few points concerning the English filtering system, which were not mentioned in your December issue. The rate of filtration in an English system depends on the size and character of the sand particles, the loss of head, the temperature of the water, the thickness of the filter and the condition of the bed as to its accumulated impurities. When the filter is clean, the velocity of flow varies directly as the square of the size of the sand particles and the loss of head, and it also bears a direct functional relation to the temperature of the water; but it varies indirectly as the thickness of the filter. When the bed is clean and operated under perfect conditions a loss of eighty inches head produces ten times the amount of water that a loss of eight inches will produce. This relation, however, only holds good for a very short time after beginning filtration, owing to the accumulation of bacterial jelly and impurities found on the sand particles.

"Mechanical filters that give satisfactory results are generally operated with a coagulant. Aluminum sulphate is commonly used for this purpose, and its amount depends largely upon the soluble organic matter and biological impurities to be removed. The

exact quantity of this that should be used can only be determined by experiment, but it usually ranges from a fraction of a grain to several grains per gallon of the water, and a turbid water requires more coagulant than a clear one. A solution of this agent is added automatically to the water as it passes to the filter, and when sufficient time is given for its proper action, the work is done in a perfect manner. To effect this change requires the presence of a basic substance, like carbonate of lime or magnesia, in solution in the water, to decompose the sulphate of aluminum. Most waters contain enough of these for that purpose. The sulphuric acid of the coagulant unites with the lime and magnesia, while the alumina is converted into a flocculent hydrate. This being formed throughout the whole mass of water, seizes onto and coagulates the albuminous matter in much the same manner that alum or an acid coagulates the albumen of an egg when added to it; and at the same time the organic coloring matter of the water is absorbed by the mordant.

"As this chemical change takes place in the water, the coagulated material entraps the bacteria so perfectly that it is an easy matter to render water nearly sterile. But to do so requires the most careful supervision of the use of the coagulant and the mechanical operation and management of the filters. At first, after washing the filters, the effluent water is necessarily more impure than it is after they have been used for some time. This is because at first there is no gelatinous bed formed to catch the coagulated impurities, but as this is gathered, it entraps more perfectly the various constituents from the water, including the hydrate of alumina, until the filters become clogged to so great an extent that they are practically inoperative. To manage filters properly requires judgment as well as scientific skill, and they can be made to give entire satisfaction only when washed frequently and controlled in accordance with the character of the salts and impurities of the water. Every filtering plant should, therefore, have a bureau of inspection of its own, and the operation of the filters should be controlled by chemical, microscopical and bacteriological tests."

Other matter called for by Mr. Baillairge will be found already answered in an article on "Mechanical Filtration" in the January number, and one on "Selecting a System of Purification" in this number of this magazine.

WATER MOTOR FOR PUMPING.

Can we find a hydraulic ram which pumps one kind of water and uses another kind as motive power? *Ladshaw & Ladshaw, Spartanburg, S. C.*

This makes the machine a water motor rather than a hydraulic ram, and probably the simplest combination for such work, if the supply of motor water is sufficient, is a water motor running a pump of desired capacity and strength to raise the water to be supplied to the required height. Some manufacturers of such machinery are represented in our advertising columns.

CITIES HAVING BOARDS OF PUBLIC WORKS.

I wish a list of cities having boards of public works, as we are considering the establishment of such a board in this city. *E. H. Towne, City Clerk, Worcester, Mass.*

The following may be mentioned as cities having boards of public works, variously constituted, whose experience will be of value in framing a plan for such a board in Worcester: Hartford and New Haven, Conn.; Newark, N. J.; Rochester, N. Y.; Columbus and Cincinnati, Ohio; Indianapolis and Fort Wayne, Ind.; Peoria, Ill.; Detroit and Grand Rapids, Mich.; Davenport, Iowa; Omaha, Neb.; Kansas City, Mo.; Denver, Colo.

CEMENT SIDEWALKS.

The question of laying cement walks is at present being discussed by the board of aldermen, and anything bearing on this subject will be acceptable. *B. A. Littell, Mayor, Opelousas, La.*

Several articles of much interest will be found in Vol. XIX, July–Dec., 1900. "Specifications (Pittsburg) for Portland Cement Sidewalks," pp. 16, 86; "Cement Streets in Bellefontaine," p. 427; "Checking of Cement Sidewalks and How to Prevent Cracking," pp. 23 and 24.

"The Directory of American Cement Industries and Hand-book for Cement Users," now in preparation for early publication, will give information and specifications for good work.

METHODS OF LEVYING ASSESSMENTS.

Can you tell me if there is any report, article or publication which will give the methods of levying special assessments in a number of cities sufficiently large to enable one to form a general idea of what is the best practice? *Irvine Watson, City Engineer, Traverse City, Mich.*

The reports of the committee on taxation and assessment of the American Society of

Municipal Improvements are valuable literature on this subject, especially that in the report of the third convention, October, 1896. D. L. Fulton, secretary of the society, Allegheny, Pa., can furnish the volume.

A glance over the tables of contents of the volumes of MUNICIPAL ENGINEERING magazine will show a number of valuable articles. There are several in the volume ending December, 1900, some applying directly to Michigan conditions and laws.

BOOKS ON HIGHWAY BRIDGE CONSTRUCTION.

I am anxious to purchase a book treating of highway bridges, wood and combination, with plans, elevations and details for spans of 50 to 150 feet, of different designs. *J. C. White, Baker City, Ore.*

Wood's "Treatise on the Theory of Construction of Bridges and Roofs" ($2) treats of all the well-known forms of bridges and is illustrated with numerous wood engravings. Boller's "Practical Treatise on the Construction of Iron Highway Bridges" ($2) is an old book and a good one, written for town committees and therefore not highly technical. It is well illustrated but not applicable in details of construction to wooden structures. Foster's "Wooden Trestle Bridges" ($5) has some treatment of short spans and of trestles. Waddell's "De Pontibus" ($3) is a new book, somewhat more technical, but still intended in part for county commissioners. It treats of steel bridges, with chapters on combination bridges and trestles. Merriman's "Bridge Design" ($2.50) is intended for the engineer and the student.

MACADAM OR BRICK PAVEMENT FOR SMALL CITY.

Is macadam regarded as a good pavement for a city of 7,000, or should brick be used?

Herman Munk.

The question of choice of material for streets in such a city is determined in part by the relative cost of the materials as well as by the relative cost of maintenance and the considerations of sanitary condition, noise, etc. In Indiana, where the questioner lives, macadam is not usually too expensive as compared with its value in relation to other materials. This is not, therefore, of much importance. A few blocks of street on which business houses face, a few alleys in the rear of such buildings, a very few streets running from the business center or large factories to the freight stations of the railroads, may have enough traffic to make it rather too difficult and expensive to keep a macadam pavement in repair, the mud cleaned off and the dust laid. It will be economical and more convenient to pave such streets and alleys with some harder material, such as brick or asphalt.

There may be one or two residence streets also whose residents are able and willing to pay for the harder pavement, but most of the residence streets of the town can scarcely afford the greater cost of the harder pavement. For them macadam is required on account of the cost. There are other arguments which often turn the scale in favor of macadam when the residents on the street are evenly divided, or nearly so. Thus macadam is more nearly noiseless; if well kept, it is quite as agreeable to look at; it is easier upon horses. In a small city all of these arguments are of much weight, while the arguments of heavy traffic, cleanliness and frequent need of repair which are potent in favor of the harder pavements in large cities lose their force in cities of this size, because, with the exceptions noted, the traffic is not heavy enough to wear the road rapidly and it is therefore durable and easy to keep clean.

Please explain how it is that ceiling battens can be seen through the plastering, even after it has received two or three coats of whitening. At the Basilica here we can disagreeably see all the centering through the plastering and the two coats of paint lately given it. At the St. Bach's church here we can too plainly see all the centering through the seven-eighths-inch pine lining and three coats—in fact, five coats—of paint. How is this?

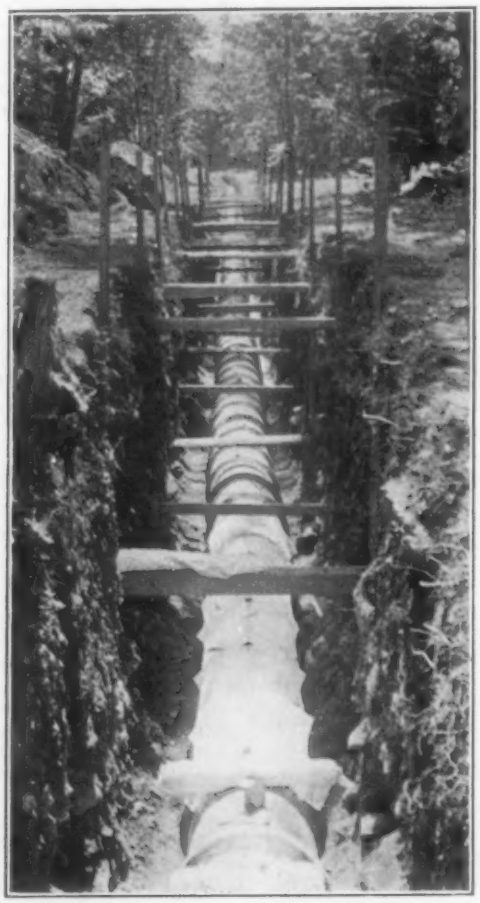
Chas. Baillairge, C. E., Quebec.

The writer has always assumed that this phenomenon was explained by the easier passage of dust-laden air through the more porous parts of plastering or ceiling, thus producing by deposit of the dust a discoloration which appears the more quickly the greater the difference in the porosity. If this does not agree with the observation of our correspondent or our readers we shall be glad to hear from them.

VITRIFIED PIPE CONDUIT, HARTFORD WATERWORKS.*

By W. E. Johnson, Superintendent, Hartford, Conn.

During the fall of 1899 the Water Commission of Hartford decided that some step must be taken to prevent the loss of water from the canal connecting reservoir No. 6 with the distributing system. Two plans were considered, viz.: that of lining the canal with some impervious material, and that of laying a line of pipe connecting reservoir No. 6 with the lower reservoirs.



A somewhat lengthy investigation of both plans ended in a decision in favor of a 24-inch vitrified pipe conduit. Two routes for the pipe line suggested themselves. In the one the pipe was to be laid in the bed of the canal with a grade of 6-10 of a foot per 100 feet, this being the grade of the canal. The other route considered and finally adopted was somewhat longer than the first and planned to utilize the entire fall of 50 feet between the effluent pipe of reservoir No. 6 and the flow line of reservoir No. 5, the length of this line being 16,700 feet and the grade 2.98 feet per 1,000 feet. A very detailed specification for kind and quality of the pipe required for the conduit was used.

Two inspections of the pipe were made, one at the time of unloading from cars in Hartford and another as the pipe was about to be laid in the trench. Duplicate blank forms for each car load were furnished the inspector, which he filled in with the result of his inspection and returned to the engineer as each car was emptied.

The pipe line, traveling as it does the side

*From a paper read before the Connecticut Civil Engineers and Surveyors' Association.

of Talcott mountain, is entirely through private property, mostly wood and pasture land, through which a right of way twenty-five feet in width was secured. The extremely rough and uneven condition of the hillside, together with the apparently large amount of solid rock to be encountered, necessitated the making of a topographical map of the proposed route, it having been decided that the minimum covering over the pipe should be three feet. From this map was planned and laid out the line for the conduit as afterward built.

To avoid as far as practicable sharp bends and at the same time to shorten the line as much as possible, the conduit at several places is laid upon embankments built for the purpose. At one point the conduit intersects at right angles a valley through which passes a highway; to avoid a long detour into the valley, with several sharp bends and a large amount of rock excavation, the pipe at this point was, for a distance of 300 feet, dropped below the otherwise uniform grade maintained throughout the line; the lowest point in the depression being 9.65 feet below the established grade. Here the conduit is carried over a small stream, three lengths of cast iron pipe supported on concrete piers being used.

The alignment of the conduit is made up of arcs of circles and of tangents; of the latter, the rolling nature of the ground allowed but few of any considerable length. It was possible to secure long radii for most of the curves, but a few were laid with radii about 175 feet in length.

The trench had a bottom width of 4½ feet, no further excavation for bell holes at the sides of the trench being necessary. The bottom of the trench was excavated (but without special care) slightly below the grade of the pipe. The grade and alignment for the pipe was obtained from a line of stakes driven in the bottom of the trench one every 12½ feet. At intervals of three feet spruce blocks 2x4x15 inches were thoroughly imbedded in the bottom of the trench, and at the same time the top of each was brought to the required grade. This was accomplished by means of a cord stretched from one grade stake to the next. As the weight of each pipe was approximately 540 pounds, a light pipe derrick was used for lowering them to their position on the spruce blocks. The alignment between the grade stakes was trusted to the man in charge. The pipe being placed in position, its inner circumference was centered with the preceding pipe and temporarily held in place by means of two hard wood wedges; the gasket having been cut into lengths sufficient to make one turn around the pipe, was worked back to the bottom of the bell in the usual manner, and the wedges were removed. The outer surface of the spigot end and the inside of the socket were corrugated or furrowed, the object being to secure a larger amount of surface and consequently a better bond. The joints were filled with a mixture of equal parts of American Portland cement (Alpha brand) and clean sharp sand; as little water being used as possible. The cement was worked into the joints by means of rammers having a face 4 inches long and 5-16-inch wide, and which were slightly curved to conform with the shape of the bell. The space at the ends of the bells was filled with cement, the finished surface forming apparently an angle of 45 degrees with the surface of the pipe.

The back filling was deferred until the cement had thoroughly set and a final inspection of the joints had been made. All openings or unevenness at the joints on the inside of the conduit were thoroughly filled with cement, thus securing one continuous smooth surface. Special attention was paid to the back filling under and around the pipe, tamping bars similar to those used in track work being principally used; the filling being carried to the top of the pipe and all thoroughly rammed. In this condition the trench was left until laying was completed and the line put to its ultimate use.

At the foot of the slope at reservoir No. 6 a well was built, and with this the 20-inch pipe leading from the reservoir and the 24-inch conduit were connected; the well is of concrete, eight feet in diameter and nine feet in depth, the connection between the well and conduit being a 30-inch by 24-inch reducer. The depth of the water in the well is controlled by means of a gate valve placed on the 20-inch pipe. The length and grade of the conduit being as given, its carrying capacity was calculated to be 8,600,000 gallons per day (n equals .012), without running under a head.

For a period of thirty days the drop in reservoir No. 6 and the rise in the lower reservoirs were carefully noted, and other factors entering into the calculation considered. These figures would indicate that the conduit was discharging about 9,750,000 gallons per day.

The work was done by the water board; the cost of the pipe line not including excavation and refilling trench was $1.49¾ per foot.

CURRENT INFORMATION.

Large Electric Plant of Brooklyn Rapid Transit Company.

The Brooklyn rapid transit company will install in the borough of Brooklyn one of the largest electric motor plants in the United States. A power house will be erected, adjoining the present power house, the cost of which, including the equipment, will approximate $3,000,000. The chief feature of the equipment will be a 24,000 horse-power motor plant. The contract for the six new engines of 4,000 horse-power each has been awarded to the Westinghouse electric and manufacturing company at a figure approximating $500,000.

Does Lighting Contract in Cincinnati Rule Out Experimental Lights.

An opinion has been rendered by Corporation Counsel Hunt to the board of public service, Cincinnati, on the right of the board to direct the placing of an incandescent light in some one of the electric lighting districts of the city. A resolution was passed by the board of legislation directing the placing of an incandescent gas light on McMillan-st., between Cleinview and Forest-aves. When the resolution came before the board of public service the opinion of Counsel Hunt was asked, who says: "Although the erection of this incandescent gas light is in an electric lighting district, you can establish such light if it does not come within the restrictions of the ordinance, No. 453, passed Feb. 3, 1893. That ordinance provides that when any street, alley, etc., is lighted by electricity under the contract with the Edison company of March 31, 1892, then all other lighting at the expense of the city of such streets, etc., 'in proximity' to electric lights erected by the said company shall be discontinued."

New York Electric Lights to Be Hung Nine Feet Above the Sidewalk.

Ordinances have been approved by the board of public improvements of New York City making it a punishable offense to hang electric lights in front of stores less than nine feet above the sidewalk. President Grout of the borough of Brooklyn is of the opinion that all lights should be taken from sidewalks, as they are dangerous to passers because of the possible breaking of wires.

Contest Between Mayor and Council in South Milwaukee.

The Hon. F. E. Mansfield, mayor of South Milwaukee, was removed from office by impeachment proceedings, Dec. 28. The removal was the result of a contest between the common council and Mayor Mansfield which originated in the negotiations for the sale of the South Milwaukee electric and power plant to the city for $27,000. A resolution passed by the council in September was vetoed by Mayor Mansfield, because he believed the price exorbitant. During his absence from the city the council passed the resolution over his veto, and the acting mayor signed it. On his return Mayor Mansfield refused to sign orders to pay operating expenses. These orders were then signed by one of the council, but the city treasurer refused to honor them. The city council then decided to impeach Mayor Mansfield on five counts. Of these the first two specified that he refused to sign orders for $107.92 and $94.34 respectively; the third alleged that he counseled the city treasurer to refrain from collecting debts due the city for electric lights furnished inhabitants; the fourth alleges that he refused to sign all orders for claims for operating the electric plant; the fifth finding claims that the electric light plant was shut down and the city is left in darkness by reason of the said acts of the mayor. Mayor Mansfield has taken the matters to the courts where the entire proceeding will be reviewed. The action of the council is exceptional, and it is believed that the court can revise the action of the council.

Conduit for Electric Wires for Duluth

Plans for a conduit under Michigan-st., Duluth, Minn., have been completed by City Engineer McGilvray. The conduit, which is for the accommodation of the electric light, telegraph and telephone wires, will occupy 33x33 ins. of space and be 18 ins. below the paving, and will have 20 ducts. The conduit is divided into two sections, one for high tension electric light cables and the other for low tension cables, like the telegraph and telephone. A 6 in. concrete wall will be placed between the sections and each duct will be separated by 3 ins. of concrete.

A Metallic Cement for Wire Joints.

A formula for a metallic cement, to be applied, without the use of heat, to wire joints by hand after the wires are twisted together, and for practical purposes taking the place of solder, is given in the American Manufacturer, as follows: "The cement is an amalgam with which a binding material is mixed so that the mass has the consistency of putty. When put up in stick form it is said not to harden except at the surface, where a crust is formed, and when the mass is worked in the fingers it becomes soft and plastic so as to be readily applied to the wires. The following ingredients are used in the proportions specified: Zinc, four parts; tin, two parts; copper, two parts; cadmium, two parts;

bismuth, four parts; lead, two parts; antimony, one part; mercury, eight parts. The solid metals are granulated and melted together, after which the mercury is added, the mass being stirred at the same time. When cooled, it is pulverized in a mortar and the binding material, consisting of liquid glucose or sirup and silicate of soda, is added in quantities sufficient to give it the consistency of putty. When spread out on a joint it is said to adhere tightly and to harden in twenty-four hours. No application of acid to the wires is necessary, and it is stated that the joint is well protected by the amalgam from oxidation. It should be taped in the usual way."

Suit on Infringement of Tesla Patent.

Suit has been filed in the United States circuit court at Cincinnati, O., by the Westinghouse electric and manufacturing company, alleging that the Bullock electric manufacturing company has infringed their rights in an electro-magnetic motor invented by Nikola Tesla on Oct. 12, 1887, and patented Jan. 28, 1888. A half interest was transferred to Charles F. Peck of Englewood, N. J., and later the patent was transferred by the two holders to the Tesla Electric company, and by that firm to the Westinghouse company. It is alleged that, in spite of warning, the defendant firm persists in the use of the patented infringement. The Westinghouse electric and manufacturing company succeeded on Nov. 5, 1900, in securing an injunction in New Haven, Conn., against the New England granite company and J. G. Patterson for similar infringement.

Acetylene Gas Lighting in Germany.

At the second annual congress of the German acetylene verein, held at Dusseldorf recently, a prize of $250 was offered for the best design of a table lamp to burn acetylene gas. A similar sum was immediately added by the carbide manufacturers. Several papers were read during the congress showing the extent of the use of acetylene gas, which seems to be more popular in Germany than elsewhere. Information as to its desirability was obtained from more than twenty German villages where it is used for public lighting, and they unanimously reported perfect satisfaction. No accident of any kind had occurred, and there had never been any interruption of service. It is used for cooking purposes in five of these towns, and at Ellerbak it is supplied at a special price for driving engines. A demonstration was made at Dusseldorf, by lighting the town halls and buildings in the neighborhood with ordinary illuminating gas, and the gardens with 800 acetylene burners, giving a total light of 40,000 c. p. The greater brilliancy of acetylene was successfully demonstrated. It is used in a number of passenger stations, a freight station at Hamline, and in the Polegate station in Sussex, England.

New Albany, Ind., Sustained in Breaking Gas Lighting Contract.

The Indiana Supreme Court handed down an opinion Jan. 8 affirming the decision of the trial court in the case of the Gaslight & Coke company vs. the City of New Albany. The appellee had granted the gas company a 20-year franchise in 1871, with a provision for extending it another 20 years in case the city did not elect to buy the gas plant at the expiration of the first term. After 17 years, however, a new contract was made by which the company agreed to furnish gas for a large number of street lamps at $1.50 per thousand feet, and to furnish it to private consumers at a slightly increased rate, and the city undertook to maintain the agreed number of lamps for 23 years. A new council was elected and provision was made for lighting the streets by electricity. The company sued for damages. The lower court decided against the company and the Supreme Court affirmed the decision.

Peoria Gas Rates in Court.

Judge Thomas M. Shaw, in circuit court, Peoria, Ill., rendered an opinion, orally, Nov. 10, 1900, in the case of the People vs. Peoria Gaslight and Coke company, of which the following gives the principal points interesting to our readers:

The first count sets forth the information that the Peoria Gaslight and Coke company has been using without legal warrant certain liberties, privileges and franchises. A demurrer to this count for indefiniteness in the description of the company and its method of incorporation is sustained. The second count asserts that the gas company charged 85 cents for gas used for fuel and $1.25 for gas used for light, though the same gas was furnished. The third count states that recently the company has charged some of its customers 30 cents, some 50 cents and some $1.25 for the same gas, and that 50 cents is a reasonable charge. The fourth count sets forth that on or about July 31, 1900, the Peoria Gaslight and Coke company entered into an agreement with the Peoria Gas and Electric company, with which it had been in active competition in some portions of the city, whereby the price of gas for illuminating purposes is set at $1.25. Relief is asked on the ground that the difference in rates for different purposes, as in the second count, or to different consumers, as in the third count, is illegal; and that the combination alleged in the fourth count to raise the price to the highest price ever charged is also illegal, and that 30 cents is a reasonable price for gas.

Demurrers to the second, third and fourth counts were overruled.

Quarter-in-the-Slot Gas Meters in Spokane Falls.

A number of automatic gas meters have been purchased by the Spokane Falls Gaslight company of Spokane, Wash., according to local press reports, by which a patron can purchase just as much gas as he wishes without having a bill presented, or without going to the office to have a man come around and read the meter. The machine is made in England, and is so constructed that the purchaser puts 25 cents into it, or as many quarters as he desires, turns a lever, and the gas flows to the amount paid for. The machine is so arranged that the gas burns low just before going out, thus giving sufficient warning. The rate is a little higher by this method, as a quarter purchases about 110 cubic feet, which makes the rate about $2.25 per 1,000 cubic feet.

Hyde Park, Chicago, Gas Rate Must Remain at 72 Cents.

Judge Gunn of Chicago granted a temporary injunction, Jan. 5, restraining the People's Gaslight and Coke company from charging more than 72 cents a thousand cubic feet for gas furnished for heating purposes in Hyde Park. Judge Gunn holds that the People's Gaslight and Coke company is bound by the obligations of the Mutual Gas company, its predecessor, in supplying gas to Hyde Park residents, and must therefore furnish the gas for heating purposes at a price not to exceed 72 cents a thousand cubic feet. The People's Gaslight company charged the rate for several years in Hyde Park, but when suit was brought to compel the company to supply gas to all its patrons at the same rate, the company raised the price of gas in Hyde Park to the $1.00 rate. This action on the part of the company was followed by injunction proceedings instituted by Frederick C. Hale.

In his decision Judge Gunn first gave an exhaustive review of the situation in the gas business in the years prior to the annexation of Hyde Park and later after the consolidation of the Chicago companies had been effected. He referred to the consolidation of the gas companies, and cited that since such consolidation the company, up to Dec. 5, 1900, or for a period of nearly three years, has been furnishing gas to the residents of the former village of Hyde Park at 72 cents; that on Dec. 5, 1900, it notified its customers in said territory that thereafter it would cease to suppy gas at 72 cents, and would charge them $1.00 per thousand cubic feet for all illuminating gas furnished, irrespective of the use made thereof. In conclusion he says:

The defendant company is authorized to sell gas for heating or fuel purposes in Hyde Park only by virtue of the gas company consolidation act. As before stated the Mutual Fuel Gas company, which it acquired, ordinance to furnish, and it had been for years furnishing to residents of Hyde Park, gas for heating purposes for 72 cents. By virtue of the provisions of Section 9 it therefore became the duty of the consolidated was compelled by the Hawk and McClary People's company to furnish to the residents of Hyde Park gas for heating purposes at the same price unless it has obtained otherwise the right to charge more.

The case will be carried to the appellate court. This is the first judicial ruling in the gas war to follow the hearing of arguments, and it is regarded as a great victory.

Heretofore injunctions and stipulations have been entered without strenuous argument.

Obstruction to Increase in Santa Rosa Water Supply Removed.

A decision was rendered in the Superior court, at Santa Rosa, Cal., Dec. 29, in the condemnation proceedings recently instituted by that city against the Fountain water company for possession of the property known as Peters's spring. The decision was entirely in favor of the city. The spring, together with ten acres of land and a right-of-way from the county road to the spring land, is located a short distance from the city's water works and pumping plant. The city's supply has not been as abundant as the city officials desire, and they endeavored to purchase this property, time and again, at some reasonable figure, but to no avail. The minimum price of the Fountain water company was $75,000. The jury placed the actual value of the land at $400 an acre, or $4,000 for the property. The case will probably be appealed.

Water Meters and Duplicate Pumping Engine Recommended for Rockford, Ill.

The report of Willis M. Kimball, superintendent of the water department at Rockford, Ill., calls attention to the need of improvements in the water works system which will prevent the crippling of the plant through accidents. He says the water department has 270 water meters in service, and the results gained by their installation in stopping wasteful practices, in discovering leaking pipes and fixtures, and in regulating absurd flat rates has more and more justified the wisdom and justice of their use. He recommends that meters be placed as rapidly as possible in the future until all factories, stores, flats, business houses and residences having sewer connections and using water are supplied with this method of measuring and selling city water. He

recommends the purchase of a new modern pumping engine of 7,000,000 to 8,000,000 gallons daily capacity. He says that a proposed self-contained electric light plant, to be stationed at the water works, the construction of a river drive and probably a public library are among the contemplated improvements which are being investigated.

Commission of Engineers to Report on Water Filtration for Washington.

An informal hearing was given Jan. 4, at Waldorf-Astoria, New York City, before the committee of the senate on the District of Columbia which is investigating the respective merits of the mechanical and the slow sand systems of water filtration. Dr. J. S. Billings, John W. Hill, Allen Hazen, Rudolph Hering, G. W. Fuller, W. P. Mason, Edmund B. Weston, Dr. William C. Woodward and Col. Miller were among the number of witnesses who testified regarding the two systems, and some difference of opinion developed. It was decided that before reaching a final conclusion as to which method shall be used for Washington, further data should be obtained. Messrs. Hazen, Hering and Fuller were appointed a commission to make a careful study of the filtration problem in the district and report its conclusions as to the best method of filtering Potomac water to the committee of the senate. It is believed that a report will be made in time to be acted upon at this session of congress.

Decree in Ogden, Utah, Water Works Case.

A decree was signed by Judge Hiles, Jan. 4, in the case of Ogden City, Utah, vs. Bear River Irrigation & Ogden Waterworks company, giving to Ogden City the sum of $266,443.91. The decision of Judge Hiles, rendered May 18, 1898, and the finding of the master of chancery in December, 1900, ordered by Judge Hiles, were given in the January, 1901, number of Municipal Engineering Magazine.

The Proposed Ramapo Water Supply for New York Attacked in Legislature.

A vigorous attack was made upon the Ramapo water scheme when the New York legislature convened recently. S. Fred Nixon, speaker of the lower house, said:

The subject of an adequate water supply for the great city of New York is one of the important matters that has occupied public attention for over a year past, and it should be permanently settled at this session that the city shall own its own supply, and if any corporation has acquired powers that might prevent any city or village in the state from owning its source of water supply the charter of that corporation should be repealed and the people protected in their right to municipal ownership.

Later a bill was introduced in the senate for the repeal of the Ramapo company's' charter. In his inaugural address Governor Odell said:

The ownership of water rights sufficient to provide the city of New York with an ample supply of pure and wholesome water should be entirely under the control and direction of that municipality. By what now seems to have been an unfortunate omission in the original charter of the city of New York, the city is not given the same rights that are afforded other municipalities for securing an additional water supply.

Contract for Hydrant Rental Beyond City Limit of Indebtedness Declared Void in Montana.

The Montana supreme court rendered a decision recently in the appeal of the Helena Water Works company from the decision of Judge McIntire in the district court. The Helena Water Works company applied for a mandamus compelling the city of Helena to audit and pay the bills for water supplied under the contract of 1897. The decision holds the contract illegal because under it the city incurred a debt when its debt already exceeded the constitutional limit and declares illegal all debt contracted under the contract, thus releasing the city from an obligation amounting to $30,000 with interest, which has accumulated during the last three years. The contract in question was made in accordance with an ordinance passed Aug. 17, 1897, providing that the city should pay the company for water $1,500 a month and $5.85 a month for each additional hydrant ordered, for five years from Aug. 1, 1897. The ordinance also provided that the council should annul taxes under the provisions of the political code of the state of Montana authorizing the levy of taxes for general purposes sufficient in amount to meet the appropriations thereby made. A tax was levied for the purpose for each fiscal year down to and including 1900. When the present mayor took the office in May, 1898, he took the position that the contract was illegal because no bids were advertised for, as required by the city ordinance; also that at the time the contract was made the city debt was in excess of the legal limit of 3 per cent., which was at most $516,000. The term "indebtedness," as used in the city charter, is interpreted by Judge Wood, who exhaustively reviews the decisions of Iowa, Illinois and Indiana, wherein the meaning of constitutional provisions, practically the same as that of sec. 6 of art. 13 of the constitution of Montana, is determined, and reaches the conclusion that the contract before the court in which a liability to pay money on a contingency morally sure to take place, irrespective of any action taken or option exercised by the city in the future, constitutes an indebtedness such as is prohibited by the express terms of the charter.

This decision is final, and no appeal can be taken. The only recourse open to the company is to agree with the council on a monthly rate or bring suit for reasonable value of the water and let a jury decide how much that shall be.

Ft. Madison Must Pay Rental for Fire Hydrants Too Liberally Ordered.

A decision was handed down by Judge McPherson of the federal court, Dec. 18, in the water works case at Ft. Madison, Ia., which supports all the contentions of the water works company and compels the city of Ft. Madison to raise by taxation the money to pay the demands of the company. The suit was the outgrowth of conditions in Ft. Madison following the ordering of hydrants by the city council. In its contract with the Ft. Madison Water Works company, made May 24, 1885, the city agreed to take fifty-one hydrants at $75 per year rental for the first forty hydrants, and $60 per year rental for each one over forty. The contract provided that the city might order in additional hydrants as it saw fit, and was to extend for twenty years, or until 1905. During a boom the city ordered hydrants liberally, until there are now 138 fire hydrants under the original contract at a rental which makes a total of $8,800, payable quarterly. The city council, finding that the city was overstocked with fire hydrants and that to pay the bills is onerous on the taxpayers, failed to pay a quarter's rental to the water works company to test the matter. The water works company brought suit in the federal court, with the result that the city will have to pay the company for the six months' fire hydrant rental unpaid and interest from the time it was due, and must continue to pay the $8,800 for five years longer.

A Water and Forest Commission Proposed for California.

At the annual meeting of the California Water and Forest Society held in San Francisco Dec. 13 and 14, arrangements were made for creating a commission to study the subject during the next two years and prepare a complete system of water and forest laws to be submitted to the legislature in 1903. The legislature, in the meantime, is asked to provide funds to continue the investigation in collaboration with the proper departments of the general government.

Park Commission Proposed for Rochester, N. Y.

Hon. George A. Carnahan, mayor of Rochester, N. Y., in his annual message favors the reorganization of the park department, and concurs with the opinion of Dr. Moore, president of the park commission, that better results can be obtained for the city's parks by vesting the management thereof in a committee of citizens rather than in a single official. He suggests the enactment of legislation providing for a park commission of five members, all of whom, except the president, shall serve without compensation.

Corporations with County Franchises Subject to City Laws Within Its Limits.

The Missouri supreme court handed down a decision Jan. 19, holding that corporations under county franchises are subject to city laws also. The opinion was given in the suit between Kansas City and the Kansas City Belt railway, regarding the construction, by the company, of bridges over its tracks in certain portions of the city. While foreman of the Metropolitan company six years ago, John Mulholland was arrested and fined because his gang of workmen excavated in the street of Westport, which at that time was not a part of Kansas City, without a permit as required. The company contended that the work was being done under a franchise granted by the county court before the limits of Westport were extended to take in the street in question. This contention was not sustained, and when appealed to the supreme court Judge Valliant decided that it should go back to the criminal court, and that the fine must be paid.

Proposed Street Railway Franchise in Columbus, O.

The granting of a twenty-five-year blanket franchise to the Columbus Railway company on all the streets in Columbus, O., now occupied by its lines, was recommended to the council by the board of public works Jan. 14. The ordinance provides that for the first ten years the company must require 5-cent cash fares, six tickets for 25 cents, with transfers, seven tickets for 25 cents without transfers, and 10-cent cash fares on owl cars. During the remainder of the life of the franchise the company must sell seven tickets for 25 cents with transfers, and charge only 5 cents on owl cars. No cash compensation to the city is provided. The ordinance has passed its first reading.

The Washington Memorial Bridge Bill.

A bill was introduced in the senate Jan. 3 by Senator Hawley, to create a memorial bridge commission of ten persons. The bill provides that the commission shall select for execution one of the two designs submitted to the senate committee in the District of Columbia. One of the designs was recommended by the board of engineers of the army, and the other was prepared by George Keller of Hartford, Conn. The architect and engineer whose design may be adopted will be placed in charge of the con-

struction of the bridge and its approaches, subject to the general supervision and approval of an officer to be appointed by the commission to be created by the bill. The chairmen of the senate and house district committees are to be ex-officio members of the commission to be created.

Comprehensive Agreement Between Labor Unions and Bridge Companies.

An agreement was signed at Buffalo, N. Y., Jan. 5, between the Building Trades council and representatives of the American Bridge company, the terms of which provide that the bridge company will employ none but union men and will pay the prevailing rate of wages with time and a half for overtime. Any questions that may arise between employer and employe are to be submitted to arbitration. The agreement covers all iron work to be built at Buffalo, Niagara Falls, Lockport, Tonawanda, the Stony Point Steel plant and contiguous territory. It is one of the most sweeping agreements made in labor circles for some time and was the result of long conferences between the interested parties, whose aim was to reach an understanding that would make strikes impossible in the bridge and structural workers' trades.

Railroads Must Replace Chicago Viaducts by Subways When Tracks Are Elevated.

A new ruling in track elevation was announced in an opinion given by Corporation Counsel Walker of Chicago, Jan. 18, who holds that viaducts may be replaced by subways in connection with track elevation, even though the city has, in the first instance, ordered the erection of viaducts. He holds that if the tearing down of a viaduct involves the question of the abolition of grade crossings on the same railroad line, then the city can compel a subway to be built. The opinion was brought out by a controversy between the city and the Chicago, Burlington & Quincy Railroad company over the proposal for the elevation of the latter's tracks.

More Track Elevation in Chicago.

The elevation of the tracks of the Chicago & Alton, Atchison, Topeka & Santa Fe and the Chicago, Madison & Northern roads in Chicago will begin early in the spring. Contracts for the iron and steel work for subways and bridges along the route have been awarded to the American bridge company, and bids will be opened soon for the concrete and masonry work. The plans include twenty bridges and subways. The entire cost of the improvements, which is to be conducted jointly by a commission of the three companies, will be about $2,500,000. It will probably require a period of about two years to complete the work. The city council ordered the tracks elevated in 1897, and after much delay the roads decided to co-operate and make the improvement.

Streator, Ill., Must Pay for Bridge—Claim of Unlawful Combination Not a Successful Defense.

A decision was rendered in the United States district court, Jan. 11, by which the city of Streator, Ill., will have to pay the Lafayette Bridge company of Lafayette, Ind., the sum of $24,800 for a new bridge over the Vermillion river. The company secured the contract for the bridge in September, 1897, for $24,800. All of the other competitors asked $42,000. The bridge was completed in August, 1898. It was claimed an unlawful combination had been entered into by the Chicago Bridge and Iron company and ten other concerns, among them the Lafayette company, to bring the price up and allow one of them to get the contract. It was also charged that each bidder was required to give a bond of $10,000, which was instrumental in keeping other bidders away. It was charged by the defendant city that the aldermen of Streator were bribed by a representative of the bridge company to give the contract to that company. When the bridge was half finished a new board of aldermen was elected, the old ones being defeated, it was claimed, because of the scandal resulting from the bribery charges. The first trial was held in Ottawa, and the jury disagreed. The case was then taken to the United States district court, with the above result. The original suit was for $40,000, which included interest, etc., on the actual cost of the bridge, but the amount awarded was the contract price.

Creosoted Wooden Block Bridge Pavement in Toledo.

The Cherry-st. bridge over the Maumee river, Toledo, O., may be paved with Kreodone creosoted block by Garrigan Bros. of that city, who are the lowest bidders. The specifications for this paving provide for a Kreodone creosoted planking three inches thick on the bridge stringers, covered with the block pavement proper, which is composed of Kreodone cresoted, long leaf southern yellow pine blocks, four inches wide, four inches deep and five to ten inches long.

It is laid with the fibre vertical on an angle of twenty-five degrees with the curb. The joints are filled with sand and a Kreodone paving cement. The specifications provide that "after the blocks have been inspected and found satisfactory they shall be placed in an air chamber, where by means of superheated steam and the use of a vacuum pump, all the sap in the blocks shall be vaporized and the moisture in them removed. When the blocks are thoroughly dry and while the

cylinder is under a vacuum of fifteen or twenty inches of mercury, Kreodone paving oil shall be admitted to the cylinder and pressure added until the blocks have absorbed ten pounds of oil per cubic foot of timber, and until the Kreodone paving oil shall have impregnated the timber throughout the entire thickness of the block." The contract was awarded at $2.50 a square yard for the block pavement, which, with the planking and other items added, brings the total cost up to $14,714.97.

The samples of the blocks on exhibition in the city engineer's office are similar to the creosoted blocks that have been laid in Indianapolis.

Confirmation of the contract has been delayed by a deficit of funds in the bridge department.

Proposed Standard Method of Conducting the Rattler Test for Paving Brick.

The Illinois Society of Civil Engineers and Surveyors has been studying the methods of testing paving brick for a number of years under the able leadership of Prof. A. N. Talbot of Champaign, who has done as much to give direction to the thought of engineers and brick manufacturers on the subject as any one.

The society has refused for some years to give any recommendation of a method of making the rattler test, believing that the matter was still too much of an experimental nature to warrant such formal action. This year, however, the committee on paving brick specifications of which Mr. Talbot is chairman, has presented a form for such tests which has satisfied the society of its substantial accuracy and value, and the society has given the method the sanction of its formal approval and recommendation that the engineers of the country make the method a part of the specifications on paving brick which they hereafter prepare. This portion of the report of the committee follows, and can be compared with the similar program prepared by the N. B. M. A. with profit. No standards to which brick must conform are prescribed, but simply the method of making the tests that the best bricks may be selected with certainty and the results may be compared with those of other experimenters.

1. Standard Rattler. The standard rattler shall be polygonal in cross-section, with 14 plane staves spaced one-fourth inch apart at their edges, and the interior shall be free from projections, offsets, roughness or obstructions. Rattlers having two staves more or less than the standard number may be used. The internal dimensions shall be 28 inches in diameter and 20 inches in length.

2. Standard Shot. A mixture of two sizes of shot will be used. The larger size will be about 2½ inches square and 4½ inches long and will weigh about 7½ pounds. The smaller size will be 1½ inches in each direction and will weigh about ⅞ pound. The shot shall be made of ordinary machinery cast iron, an all edges shall be made rounded to a radius of about ¼ inch. The individual shot shall be replaced by new pieces whenever they have lost one-tenth of their original weight. For the standard size of rattler the standard charge of shot shall consist of 75 pounds of large shot and 225 pounds of small shot.

3. Number and Condition of Brick. For the standard size of rattler, 12 paving bricks or nine paving blocks will constitute the number to be used in a single test, but two more or less than this number may be used. The bricks shall be thoroughly dried before testing.

4. The Test. The rattler shall be rotated at a rate of not less than 28 nor more than 30 revolutions per minute, and 1,800 revolutions shall constitute the standard test. The speed requirement is important.

5. The Results. The loss shall be calculated in percentages of the original weight of the dry brick composing the charge. In weighing the rattled brick, any piece weighing less than one-half pound shall be rejected.

6. Variations in Size of Rattler. Rattlers 28 inches in diameter and of a length greater than 20 inches may be used, in which case the charge of shot and the number of brick shall be increased proportionally to the increase of length. Rattlers of smaller diameter will give smaller losses, which cannot be accuratey compared with those obtained with the 28-inch diameter. However, if 24-inch or 26-inch rattlers are used, it is recommended that the charge of cast iron shot be equal in volume to 10 per cent. of the volume of the rattler, which is about 1 pound of shot to each 40 cubic inches of rattler volume. For a 24-inch machine the charge should be composed of half large size and half small size of shot, and for the 26-inch machine one-third large and two-thirds small size.

The Venezuelan Asphalt Controversy.

The developments of the past month in the controversy over asphalt concessions in Venezuela indicate that the difficulties arise from the possibility of executive action in that state upon such matters independently of the courts and the consequent contest over conflicting decisions. It is now expected that the contentions of the interested parties will be submitted in due form to the Venezuelan courts and decided by them according to their respective merits. This is the practice in the United States in such cases and will doubtless be satisfactory to both parties if it can be followed in Venezuela.

Repairs of Asphalt Pavements in Buffalo.

The recent report of F. V. E. Bardol, chief engineer of the board of public works, Buffalo, N. Y., regarding the condition of the asphalt pavements in that city, states that the criticisms made last summer arose primarily on account of the system formerly in force for paying for street repairing.

Although this has been changed, Mr. Bardol believes that further amendments to the rule are desirable. During recent years communications have frequently been sent to the common council calling attention to the condition of the streets, and if prompt action had been taken on the receipt of these letters the opposition to improvements would not have been so strong because there would have been fewer streets to repair at any one time. As it was, the situation in Buffalo last summer was aggravated by the large number of streets reported as being in need of immediate repair. He says that criticisms have been made that streets are accepted in such poor condition that extensive repairs are necessary as soon as they pass under the control of the city. In order to show that this is an entirely erroneous assumption, Mr. Bardol quotes that on 84 streets whose guarantee expired in 1898, the total cost of repairs during 1899 was $1,127, or 7 mills per sq. yd.; of streets with guarantees expiring in 1897, 4 out of 45 needed repairs in 1898, and cost 7.7 mills per sq. yd.; and in 1899 13 streets were repaired at a cost of 2¼ mills per sq. yd.

When defects appear in asphalt pavement, the first charge made is poor asphalt. Mr. Bardol believes that this is usually due to ignorance, malice or prejudice; that the people who attribute the result to such causes have never given the subject serious thought. The durability of the pavement is controlled by other conditions, such as the manipulation of the material, the kind of sand, the foundation and its mode of construction, as much as the asphalt itself. Mr. Bardol says that with the clayey soil found in most parts of Buffalo it is practically impossible to replace the material in trenches so as to avoid subsequent settlement. The practice in that city has always been to order the pavement and then put in the necessary sewer and water connections during the time occupied with the paving proceedings. Notices are sent out to give the property-owners a chance to make their own connection. As a consequence, this work often falls into the hands of an unscrupulous plumber, with whom inspection means a man to watch every shovelful of backfilling to see that it is properly tamped.

In order to be sure that the work is properly done, as many inspectors are required, therefore, as there are excavations. Connections that are left out are put in by the paving contractor at a fixed price and guaranteed by him for the same period as the pavement. Of settlements required by the Barber asphalt paving company on streets lapsing from guarantee in 1898, 465 square yards were over its own connections and 16,699 square yards over trenches made by individuals and corporations. The remedy for this is for the city to control all street work by doing the work itself or having it done by some responsible party under a guarantee against settlement, and even then the streets should not be paved until the year following the work on the underground improvements.

In Buffalo, cracks, which are generally due to the contraction caused by cold, appear most frequently on streets having little or no traffic. It is believed that this is due to the fact that asphalt, being plastic, is kept free from cracking by the constant kneading produced by traffic. Absence of traffic tends to allow the asphalt to become more or less spongy or porous, owing to the changes in temperature. If a pavement cracks under heavy traffic, it is considered an indication that the asphalt cement is at fault, being deficient in bitumen and too hard for want of sufficient flux.

In the older Buffalo pavements waviness was due to the sliding of the mixture on the concrete, but this has been overcome to a large extent by the use of the binder course, which was introduced for the purpose of remedying this particular defect. Mr. Bardol states that shoves or ridges, usually extending from the curb toward the center, are caused by the swelling of the cement used in the concrete, and are due to defects in manufacture from the following causes: Faulty components of the raw material, imperfect preparation of the raw material, imperfect burning, and too high a percentage of sulphur or magnesia.

Swelling, due to much lime, shows itself in a very short time. He also states that disintegration in spots is due to various causes, which are classified as follows: Material of an inferior quality, improper proportion of mixture, careless manipulation, a poor foundation and bad drainage.

According to Mr. Bardol the value of an asphalt depends on the amount of bitumen it contains, provided, of course, that the bitumen meets the proper test. It would seem that the deposit having the least percentage of foreign substances would give the most uniformly satisfactory results, but it does not follow from this that, because a deposit is more or less impure, these imperfections are willfully multiplied. He states also that the larger the percentage of impurities, the greater the quantity of asphalt that must be used to get the proper amount of bitumen in the mixture. He says: "A pavement deficient in asphaltic cement or laid with a too hard cement crumbles under traffic.

Defective spots sometimes occur that are due to poor binders; this is more noticeable with coal tar binders than those made of asphaltic cement. An excess of cementing material in the binder tends to soften the wearing surface. In a binder mixed too rich the asphalt cement or tar flows to the bottom of the load in transportation, and that unloaded last from the wagon on the street is

mushy. Coal tar particularly seems to soften the wearing surface; the piece affected will have a strong odor of the tar and give a greenish fluorescence in carbon bi-sulphide. Illuminating gas is also said to have an injurious effect on asphalt, Mr. Dow of Washington stating that patches have been ruined from this cause in fourteen months.

A good asphalt surface depends as much on its proper preparation as on the raw materials entering into its composition. The material was frequently burned in the past by allowing the sand to become overheated. This danger is avoided in the newer plants by the use of a steam jacket in place of direct heating. The burden of the responsibility of properly handling their product must be made to rest on the paving company by the enforcement of their guarantees.

In Mr. Bardol's estimation water is the chief cause of disintegration of asphalt pavements and he atributes to it the nodules or macaroon spots which constitute a large percentage of the defects. These spots break up in lumps and have some apparent regularity of form. They break from the bottom upward, and if examined it will be found that some grains of sand, particularly those near the bottom, are not covered with asphaltic cement; also that the bond between the wearing surface and the concrete is broken, allowing the former to become rough and wavy. He states that water standing on the surface injures the pavement, some asphalts being affected more easily than others. Damage, however, comes from the moisture under the pavement, which finds its way there through the cracks from railway tracks, through holes in the wearing surface, and from the adjoining earth. As a rule the ordinary fine cracks do not, Mr. Bardol believes, allow water to reach the foundation, for they soon become filled with dirt. The amount of water percolating through the pavement between and along the rails of a track depends on the type of track construction. A concrete base under the roadway, with a heavy rail and a first-class impervious pavement between the tracks and rails, does not allow water to reach the foundations except through the joints along the rail and pavement, particularly along the inner lip of the rail, which forms a trough or conductor for the water. A drain tile placed just beyond the outer rails would tend to intercept any leakage and is advisable on all streets having car tracks. Water entering holes in the wearing surface must of necessity affect the adjoining pavement, particularly in the case of holes formed during the winter, which cannot be repaired until spring. All that can be done is to fill up the holes as soon as practicable. The general practice in Buffalo since 1892 has been to place drain tile behind the curbs, which tends to intercept whatever water finds its way under the pavement. Its efficiency depends upon proper laying and freedom from disturbance afterward. Attention has been called frequently to instances where companies using the streets set poles without regard to the drain tile. This is also true of plumbers in connections.

Regarding criticisms that have been made about the manner in which the repairs are made in Buffalo and the assertion that some spots are repaired twice, he says: "This cannot be denied, but the city is protected because the patches are guaranteed for three years and in case they fail the company replaces them without cost to the city. Nearly $50,000 was deducted from the bills for asphalt paving presented during 1897-99 for patches which did not wear well during these three years. In order to ascertain the amount of overlap, each patch is located on a profile showing its exact size and position, the amount of work done in different years being indicated by different colors. The magnitude of this work can be appreciated from the fact that about 100,000 patches are made annually. Overlaps are deducted when the patches fail from any cause. It is evident that when a defective spot is marked it is impossible to say how long the old material to which the patch is joined will stand, and the patch will, of course, suffer with the old material." He says that much of the criticism about repairing was due to the failure of patches put in with the Perkins heater by the skimming process. Until two years ago this method was used almost exclusively. Since then it has been used only in repairing settlements. Buffalo's experience in patching has been that where the original material is sound and a depth of one inch is given for the skim, the patch, if carefully made, will hold. Its cheapness has been the only reason for its extensive use, the cut out patches costing 50 per cent. more. The committee on street paving of the American Society of Municipal Improvements recommended it in 1892. Mr. Bardol says the present practice is to cut out the defective material down to the concrete. The specifications provide the following: "The binder will be hauled to the work while hot, carefully spread on the base with hot iron rakes to such a depth that the least thickness from the topping or wearing surface will be 1¼ inches, when the sum of the topping and binder is not over 2 inches. Beyond this the thickness of the binder may be increased."

Indiana Bill Providing Gravel Road Supervision.

A bill will be introduced in the Indiana legislature by Senator Johnson, of Craw-

fordsville, to change the system of maintaining gravel roads. Under the present system the gravel roads are looked after by the supervisors of districts. These supervisors receive small pay for their work, and cannot be expected to devote the time and care to it that they would if they were better paid and had more time for their work. The proposed bill provides for a superintendent of gravel roads for each county, whose duty it will be to take care of these roads, let the contracts for supplies for keeping the roads in good repair, and award these contracts by the year. The office will be an appointive one.

Good Roads Economy.

The following is an extract from the annual address of the President of the Illinois Society of Engineers and Surveyors at its recent convention:

One of the most widely extended causes of complaint in a prairie state like Illinois is the condition of its roads. There is a wide difference in the opinion of the people regarding the proper handling of this subject. The engineer wants a road that can be traveled over at any season of the year, no matter what it costs. While the poor farmer with a small outfit and little return for his badly directed labor cannot see the advantage of taxing himself for this kind of a road when the present roads are passable for a fairly large proportion of the year and can be kept passable in good weather with a small amount of labor and no expenditure of money. The engineer has had all of the argument with him until the extravagance of some of the claims made by the advocates of good roads has brought about a reaction which bids fair to go as far in the opposite direction with the same disregard for actual fact. As usual the middle ground is the safest.

The engineer must recognize the fact that a good road may cost so much that it is not good economy to build it. That anything which an engineer would call a good road is beyond the limit of economy for a large majority of the road mileage, especially in the central and southern portions of the state, is a proposition which can hardly be considered open to discussion. The engineer, then, must accept the situation, if he is wise, and put himself to experimenting on the making of good enough roads at less cost. In this connection I would suggest a consideration of the results of the experiment recently made by a California road supervisor with hot heavy oil in forming an asphaltic sort of surface for a road which Illinois roads can be made to approximate at very little expense.

On the other hand, the farmer must finally recognize the fact that the ability to get to town at will and to communicate at pleasure with neighbors, friends and business connections is worth a considerable sum of money. I have had too many experiences with farmers shut out of the world for days on account of bad roads with good weather, to have any sympathy with the argument that the farmer's time in hauling he can do it when he has nothing else to do. I am not speaking of the farmer who will not go to see his sick daughter a mile away because it is not easy to get out the team that can go there over the road, nor of the one who burns his corn because it is easier to do that than to take it to market and bring home the equivalent in coal, and what little balance of profit there may be, but of the wide awake farmer who is always on the lookout for business and who utilizes to the utmost the force necessary to carry on the farm; the farmer whose like is coming into possession of the valuable land more and more each year. I have quoted elsewhere the case of the farmer who lost enough on the difference in price on his wheat between the day of high prices and the first day he could get to market to pay his year's assessment on a good road. His case of course was paralleled to some extent by that of every farmer on the road. True economy demands therefore a careful study of the conditions of the area served by a road and a decision as to character and cost of road in accordance with the data thus obtained, eliminating theories, attractive or otherwise, which cannot stand the light of these facts.

New York "Stone Cutters' Law" Invalid.

An opinion handed down Dec. 31 by the appellate division of the New York supreme court, renders inoperative the act of 1885, known generally as the "Stonecutters' law." A statute enacted five yeare ago required that all stone used in municipal work in the state of New York, except paving blocks and crushed stone, should be worked, dressed and carved within the boundaries of the state.

The case in which the opinion was rendered was that of Ralph J. Treat, a contractor, who sought to obtain $3,218 as an installment on sewer work. Bird S. Coler, comptroller, declined to pay on the ground that Treat was not using stone cut in the state of New York, and he was sustained by the lower court. The relator contended that the clause in the contract inserted in pursuance of the statute to carry out its provision was in conflict with the act of congress of July 2, 1900, declaring illegal various contracts, combinations or conspiracies in restraint of trade or commerce among the several states; also, that the statute is in conflict with the state constitution and the fourteenth amendment of the United States constitution.

Cost of Indianapolis Improvements in 1900.

The annual report of the city assessment bureau of Indianapolis, Ind., for 1900 has been completed by Myron D. King, chief of the bureau. A comparison of the work accomplished in 1900 and in 1899, shows a material decrease in municipal improvements during 1900. The fact that by the end of the year 1898 nearly all of the prominent

crops to market is worth nothing, because streets in the city were improved, is cited by Mr. King as a reason for the decrease. The net decrease for 1900 over 1899 was $283,362.36. There are still many streets to be improved, but the majority of the unimproved streets cannot be permanently improved because the law provides that the cost of improvement cannot exceed 25 per cent. of the value of the property. In 1899 five main sewers and eight local sewers were built at a cost of $108,245.79 and in 1900 no main sewers and twenty-three local sewers were built, at a cost of $49,560.17; decrease, $58,685.62. In 1899, 73 cement and four brick sidewalks were built at a cost of $99,477.12, and in 1900 forty-nine cement walks and no brick walks were laid at a cost of $56,318.89; decrease in cost, $43,158.23. Alleys were constructed in 1899 as follows: Brick, 17; gravel, 23; bowlder, 2; asphalt, 1; cost, $26,201.77; in 1900, brick, 7; gravel, 8; cost, $5,168.06; decrease in cost, $21,033.71. Roadways in 1899: Gravel, 26; block, 8; asphalt, 5; brick, 5; cost, $294,835.35; in 1900, gravel, 18; block, 3; asphalt, 4; brick, 9; cost, $140,129.59; decrease in cost, $154,761.13. The cost of sprinkling in 1899 was $45,766.64; in 1900, $40,086. 90; decrease in cost, $5,679.74. The reason given for this decrease is that the city let the contract and paid for the work. The cost of sweeping in 1899 was $44,374.81 and in 1900 was $44,275.55, decrease in cost, $99.26.

Concrete for Lining Colliery Drifts and Shafts.

Concrete has been extensively used instead of brickwork for lining circular shafts, drifts, air-passages, etc., at the colliers of the John Cockerill Company at Seraing, in Belgium. The Engineering and Mining Journal says: "The concrete used has been made entirely from blast furnace slags, those from forge iron, broken to 30 or 50 mm., being used as ballast, while the mortar is made of granulated slags, hydraulic lime in the proportion of 5 to 1 by volume and slag cement. These are incorporated in a mortar-mill, but no addition of water is necessary, as the granulated slag contains enough. Slag cement is made of about 75 per cent. of granulated gray iron slags and 25 per cent. of slacked lime. When the slags are tolerably uniform in character chemical analysis of the materials is not necessary except when the furnace charges contain magnesia, which should not be present to a greater extent than 3 per cent. The materials required for a cubic meter of concrete are 0.750 cubic meter granulated slag and 0.150 cubic meter hydraulic lime."

Comparison of Cost of Systems of Disinfection in Havana.

After an investigation of the Woolf system for the electrolysis of sea water, which has been and is in use for disinfection purposes in Havana, Cuba, Walter Reed, surgeon, U. S. A., says:

It seems fair to conclude that had the sanitary authorities of Havana resorted to chloride of lime as the disinfectant instead of electrozone, the work of disinfection would have been more thoroughly carried out and the insular funds would have been richer by $69,231.

Major Reed says further that chloride of lime to which hydrochloric acid has been added, is rendered as effective in disinfectant qualities as electrozone, and is very much cheaper. These two agents are readily procurable, and the cost of 24,000 gallons of disinfectant, says Major Reed, would be only $76.08 per day. The total expenditure for sufficient chloride of lime and hydrochloric acid to have supplied a disinfectant having 146 grains of available chloride per gallon, from July 1, 1899, the time the Woolf system was placed in operation, until March 31, 1900, would have been $17,802. The electrozone plant cost for this length of time $75,000.

City Engineer of Hamilton, Ont., Reports on Sewage Disposal.

The annual report on the sewage disposal works has been prepared by City Engineer Barrow at Hamilton, Ont. During the last year the works have been operated at an expenditure within the appropriation, although considerable work was done in the way of improvement at both works, and wages were increased. Attention is called to quite an increase in the flow of sewage during the year, and also to the large amount of water waste, which has been quite noticeable. The consumption of water has been over ninety gallons per capita, whereas seventy gallons per capita should be ample. At the Ferguson-ave. station the total flow of sewage was 918,214,571 gallons, and for the east end station, 391,951,166 gallons, making a total of 1,310,165,737 gallons, which is an increase of about 10 per cent. over the flow of last year. Plans have been prepared and estimates submitted for a sewage disposal station at the west end, and for extending the present brick sewer into deep water. The proposed method of purification is the bacterial or biological system.

The Discovery of Septic Tank Action Followed by Filtration in Sewage Purification.

The communications that have appeared in Municipal Engineering during the last two or three months have covered the field quite fully and given the information upon which an opinion can be based by our readers as to the origin of the septic tank and claims regarding its invention. The following letter is given for the item of informa-

tion it contains and closes the cases until something new and important appears.

To the Editor of Municipal Engineering:

Sir—In your current issue Mr. J. N. McClintock refers again to Mr. Glover's expired patent of 1882 to substantiate the claim of his company to control the use of septic tanks. This was familiar to me when my previous communication was written and does not in my judgment help Mr. McClintock's claim. I have no desire to enter into any controversy, but would, in the interest of the engineering profession, suggest to your readers that a personal examination of copies of the patents to which Mr. McClintock refers will probably dispel any apprehension, founded on Mr. Glover's claim, as to the right of the public to use the septic tank process. An attempt to control the use of septic tanks appears in patents Nos. 634,423 to 634,428, inclusive, of Oct. 3, 1899, issued to Donald Cameron and associates, but these also apply to special forms and devices and can hardly be stretched to cover the exclusive use of so old an appliance. JOS. O. OSGOOD.

New York, Jan. 2, 1901.

Plans for Septic Tanks Declared Insufficient for Columbus, O.

The Ohio state board of health has disapproved the proposed plans for a septic tank system of sewage disposal for Columbus, for the following reasons:

First—The possibility that open septic tanks for 40,000,000 gallons of sewage will of themselves create a nuisance.

Second—The certainty that septic tanks alone will not prevent pollution of the river in low water, nor remove the nuisance, the chief object for introducing sewage purification works.

Third—The excessive cost of artificial filters that will be required to purify the septic tank effluent, and the uncertainty with regard to the life of such filters.

Fourth—The lack of exact, scientific knowledge of the septic tank process under varying conditions (i. e., with sewage of different compositions) and the possibility that this process on a large scale may not prove to be of permanent value.

This action of the state board of health throws back upon the sewer commission the whole problem of sewage disposal without any recommendation of a plan that would be satisfactory to the board.

Electrical Pumping for Havana Sewage.

Electrical machinery is proposed as a part of the equipment for a new sewerage system for the city of Havana, Cuba. The Electrical Review gives information regarding the proposed scheme as follows:

The sewage of the entire city is to be collected on the west side of the harbor in a siphon, raised at the main pumping station twenty-four feet and discharged through an outfall tunnel and sewer 1,190 meters long, and thence into the sea in thirty feet of water through two five-foot pipes. At the discharge well on the west side of the harbor, where the sewage is first collected, a centrifugal pump with a capacity of 30,000,000 gallons per day, eleven feet lift, direct-coupled to an electric motor, will be installed for temporary use, while the siphon and permanent station are being built for emergency use thereafter. It is proposed to purchase the current required to drive this pump.

In Vedado, a suburb of Havana, two substations, which will be of underground masonry contruction, will be built. One of these will contain two sub-lifts, each consisting of a motor and direct-coupled centrifugal pump with a capacity of 2,500,000 gallons of sewage per day for a lift of nine feet, and the other will contain two sub-lifts, each with a capacity of 800,000 gallons per day, the lift being ten and one-half feet. Both sub-stations will be arranged to work automatically. These stations are both to be supplied from two direct-coupled electric generating outfits of twelve kilowatts capacity installed in the main Vedado pumping station.

Bonded Indebtedness of New York City.

In his annual message to the municipal assembly Jan. 15, Mayor Van Wyck of New York City stated that the bonded indebtedness of that city on Jan. 1, 1901, was $279,725,370.38, an increase of $24,949,334.97 during the year 1900. The amount of the bonds which appeared in Jan. 1, 1900, has been reduced during this period, however, by the sum of $4,440,917.39 so that the actual increase has been $20,508,417.58.

Sewage Disposal at Brookfield, Mo.

A simple method of sewage disposal for a small town has been constructed at Brookfield, Mo., from plans of Mr. Hiram Phillips, M. Am. Soc. C. E. No great claims are made for the method, but it is believed that it will serve the purpose for which it is intended,—to confine the offensive odors to the vicinity of the disposal works and to remove the solid matter in suspension in the sewage.

Brooklyn has a poulation of about 6,000. The disposal plant covers an area of about ten acres, which is sufficient under present conditions. The disposal system consists of two carrier flumes running along the upper side of the field each way from the highest point, at which the sewage is delivered, and a series of settling ditches. Sewage is delivered from the flumes by sluice gates at any desired point into the ends of the ditches running across the fields. The lower ends of these ditches are all connected with a ditch running along the lower side of the field, which empties by an outlet ditch into a small natural watercourse. There are sluice gates at each end of each of the settling ditches so that the sewage flow can be directed entirely or in any part through any ditches desired. The fall in all the flumes and ditches is very slight, so that the settlement of suspended matters is practically complete. When ditches are

clogged by sewage matter they can be filled up with the dirt excavated from new ditches adjacent and later the same area can again be used for a ditch. During the summer very little, if any, of the sewage reaches the natural watercourse, all having evaporated or percolated into the soil. The field has been in operation about a year.

Midland Municipal Officers' Association, England.

A Midland Municipal Officers' association was formed in Birmingham, England, recently. The association will represent a radius of twenty miles from the center of Birmingham. Only permanent officers holding appointments under county, borough and district councils will be eligible. In addition, the membership will practically be confined to those who are connected with the constructive work of local authorities, such as divisional and district surveyors, road surveyors generally, superintendents of parks, sewage farm managers, etc. The general objects of the association include the advancement of the general knowledge and capabilities of the members, by arranging for periodical lectures, essays and discussions on subjects of common interest, such as road construction and maintenance, sewage disposal, water supply and other questions of sanitation, electric lighting, traction and other branches of municipal work, supplemented as opportunities occur, by visits to local works in progress. W. H. Clary, borough surveyor of Sutton-Coldfield, was elected president.

Convention of Illinois Society of Engineers and Surveyors.

The Illinois Society of Engineers and Surveyors held a very successful convention at Bloomington Jan. 23-25 under the direction of President Charles Carroll Brown and the Executive Secretary and Treasurer, M. S. Ketchum of Champaign. An important paper was that by Wm. H. Herron, upon a topographic survey of the state. A co-operation with the United States Geological Survey was recommended and a clear and forcible presentation of the value of the kind of survey and map proposed was made. The result of the ensuing discussion was a series of resolutions indorsing the proposition and asking its consideration by the legislature.

The evening session of Wednesday was devoted to the discussion of the various phases of the good roads question. Prof. Baker's paper on the "Cost of Earth Roads" and Mr. A. H. Bell's paper on the "Hard Roads of McLean County" were practical papers, selections from which will appear in our columns hereafter. Prof. Baker also presented a paper on the "Cost of Wagon Transportation" which aroused considerable discussion, developing some differences of opinion. The conclusions of the paper were conservative and valuable. They are as follows:

1. The ordinary maximum cost to freighters on earth roads is not more than 25 cents per ton-mile.
2. During the summer months the cost to freighters on level loam roads is about 20 cents per ton-mile.
3. With a little choice as to the time of doing the work, the cost to the farmer is not more than 10 to 12 cents per ton-mile on earth roads; and where farm work is not pressing the cost is not more than 6 to 9 cents per ton-mile.
4. The cost to farmers of hauling upon the best stone roads would not be much less than the cost upon earth roads when in their best condition, since the best earth roads are nearly as good as stone roads.
5. The cost of hauling upon stone roads is much less than upon muddy earth roads, but most farm produce that goes to market in full loads can wait for a favorable condition of the earth roads. The possible saving in the transportation of freight by wagons through road improvement will be an insignificant part of the cost of such improvement. This does not mean that the roads should not be improved, but it does mean that no great improvement can be justified alone on the ground of reducing the cost of transportation.

That one large factor in the value of good roads is the reduction in the amount of fluctuation in prices of farm products, was a point prominently brought forward, and it was decided that this made good country roads of value to every citizen of the state. A resolution approving of the movement for state aid in building good roads was therefore passed. The principal part of the report of the committee on paving brick tests is given elsewhere. There were several good papers and discussions upon brick and brick paving, and Mr. W. H. Tarrant's paper upon the subject will appear later

As usual the committee on railroads presented an excellent report and a number of good papers on railroad matters. Two new committees on architecture and on mechanical engineering also contributed largely to the value of the meeting. Prof. N. C. Ricker's description of the working of the Illinois law for the licensing of architects was of great value, as showing the success met with in this first application of the principle to a profession of this nature. The success reported in this line led the society to believe that a similar success would follow the passage of a similar law regarding the practice of surveying, and the full influence of the society will be thrown in favor of a bill of this nature. Some extracts from Mr. B. J. Ashley's paper on "Designing a City" will appear later as giving the practical detail of planning a city from a novel and unusual standpoint.

The officers elected are: President, H. G. Paddock, Moline; vice-president, Emil Ru-

dolph, Chicago; trustees, P. C. Knight, Pontiac; J. G. Mellulish, Bloomington. The next meeting will be held at Joliet.

Commission on Improvement of Chicago River Appointed.

A committee of five experts has been appointed to consider the improvement of the Chicago river, and to report its conclusions to the trustees of the Chicago sanitary district March 1. The committee is as follows: Lyman E. Cooley, Ambrose V. Powell, L. P. Friestedt, to solve engineering problems; Orrin N. Carter, John P. Wilson, to consider legal aspects of the situation. In addition a committee has been appointed to co-operate with the foregoing committee, as follows: Major J. H. Willard, in charge of the river and harbor district; Lawrence E. McGann, commissioner of public works; Corporation Counsel Walker, representing the city; Chief Engineer Isham Randolph, General Counsel John S. Runnells and Z. R. Carter, chairman of the finance committee, in behalf of the sanitary district. An invitation has been extended to the state board of health, the city health department, the board of trade, the real estate board and the River improvement association each to appoint a representative on the committee.

Annual Meeting of American Society of Civil Engineers.

The annual meeting of the American society of civil engineers was held Jan. 16, and officers were elected to serve during 1901, as follows:

President—J. James R. Croes, New York City.

Vice-Presidents—Henry S. Haines, New York City and George H Benzenberg, Milwaukee, Wis.

Treasurer—Joseph M. Knap, New York City.

Directors—Josiah A. Briggs, New York City; George F. Swain, Boston, Mass.; Emil Kuichling, Rochester, N. Y.! Mordecai T. Endicott, Washington, D. C.; Edward C. Carter, Chicago; Frank C. Osborn, Cleveland, O.

The Norman medal for the year ending with the month of July, 1899, was awarded to E. Herbert Stone, M. Am. Soc. C. E., for his paper on "The Determination of Safe Working Stress for Railway Bridges of Wrought Iron and Steel." The Thomas Fitch Rowland prize for the same year was awarded to R. S. Buck, M. Am. Soc. C. E., for his paper entitled "The Niagara Railway Arch." The Collingwood prize for juniors for the same year was awarded to Julius Kahn, Jun. Am. Soc. C. E. (now Assoc. M. Am. Soc. C. E.), for his paper entitled "The Coal Hoists of the Calumet and Hecla Mining Company." Awards for the year ending with June, 1900, were as follows:

The Norman medal, to James A. Seddon, M. Am. Soc. C. E., for a paper on "River Hydraulics."

The Rowland prize, to Allen Hazen, M. Am. Soc. C. E., for a paper on the "Albany Filtration Plant."

The Collingwood prize, to Robert P. Woods, Jun. M. Am. Soc. C. E. (now Assoc. M.), for a paper on "Street Grades and Cross Sections in Asphalt and Cement."

The following nominating committee was elected: Ira A. Shaler, district No. 1; S. E. Tinkham, district No. 2; J. F. Alden, district No. 3; P. L. Wolfel, district No. 4; Onward Bates, district No. 5; R. Montfort, district No. 6, and C. D. Marx, district No. 7.

The committee on cement reported progress, and was authorized to add to its numbers in its own discretion.

Convention of Michigan Engineering Society.

The twenty-second annual convention of the Michigan Engineering society was held at Ann Arbor, Mich., Jan. 8, 9 and 10. The program contained the following papers: "The Life Work of George E. Waring, Jr.," G. Everett Hill., C. E., New York City; "The Surveyor in the Presence of the Court," Prof. J. C. Knowlton, Ann Arbor; "The Topographical Survey of Michigan," Prof. I. C. Russell, Ann Arbor; "An Odd Job for Uncle Sam," A. W. Barber, Washington, D. C.; "The Available Water Power of Michigan and Its Economical Development," Robert E. Horton, Jr., United States geological survey, Utica, N. Y.; "The Marls and Clays of Michigan," Prof. Delos Fall, Albion, Mich.; "The Manufacture of Portland Cement," Bernard L. Greene, C. E., Cleveland, O.; discussion, "Cement Manufacture in Michigan;" "Cost of Installing a Water Meter System," A. L. Holmes, Grand Rapids, Mich.; "Stand Pipes and Elevated Reservoirs," George S. Pierson, Kalamazoo; "Electrolysis," W. W. Brigden, Battle Creek; "Deep Well Supply," Micah Walker, Fenton; "Retrospective and Prospective Views of Water Works," George L. Wells, Buffalo, N. Y.; "Asphalt Pavements of Pontiac," Wiliam J. Fisher, city engineer, Pontiac; "Suitable Streets for Small Towns," Frank F. Rogers, Port Huron. Report of committee No. 4; "Roads and Paving," presented by George M. Ames, chairman, Grand Rapids, and followed by discussion. "The Toll Roads of Michigan," D. Farrand Henry, Detroit; "The Many-Sided Engineer," Francis Hodgman, Climax; "A Professional Esprit de Corps," George S. Pierson, Kalamazoo; "Accomplishing the Impossible," H. K. Whitney, Battle Creek; "City Boards and Councils," F. F. Rogers, Port Huron; "What We Drink," Micah Walker, Fenton; "That Base Line," Dorr Skeels, Grand

Rapids; "An Engineer's Place in Politics," E. W. Muenscher, Manistee; "The Question of an Engineering Job," Prof. M. E. Cooley, Ann Arbor. Officers were elected for the ensuing year as follows: President, William B. Sears, Saginaw; vice-presidents, M. E. Cooley, Ann Arbor; A. L. Holmes, Grand Rapids; Joseph Ripley, Sault Ste. Marie; secretary and treasurer, Francis Hodgman, Climax. The next convention will be held in Grand Rapids. Some of these valuable papers will appear in our columns at an early day.

Washington to Have a State Road Commission.

A bill will be presented to the Washington state legislature, which proposes to appoint a state road commission, which will have entire charge of the construction of roads throughout the state. The roads thus built will be state highways, and one-half of the expense of building will be borne by the state. A state road commission is to be appointed at a salary of $3,000 per year.

Engineering Association of the South.

At the regular monthly meeting of the Engineering association of the South Jan. 10 it was decided that the continuance of individual publications was preferable to uniting with the Journal of the Association of Engineering societies. W. H. Holmes, an American engineer who has recently returned from Korea, presented a paper giving a description of the methods of doing some bridge pier foundation work in Chemulpo. The system of keeping records of rivers in that ancient country was briefly described. They extended back into the past for many centuries and are said to be very accurate. Mr Holmes stated that where an opportunity offered itself for a check the records were in every case sustained. The record for the river in question extended back 509 years and explanation was made at the beginning of the records that the history of the river previous to that time had been consumed in a fire which had burned the house and all contents. Julian Kendrick, city engineer, Birmingham, presented a paper giving an exhaustive and interesting study of the sewage problem now confronting the Birmingham district. The geographical features of the drainage area were described, the difficulties, in carrying out the various methods of sewerage set forth and finally a plan proposed.

Technical Meetings.

At the meeting of the American Society of Civil Engineers for Feb. 6 Charles L. Crandall will present a paper on "The Adjustment of a Transit Survey Compared With That of Compass Survey." At the meeting of Feb. 20 Mr. G. N. Houston will present a paper on "The Construction of Gravity Sand Filters at Nyack, N. Y.

The third annual convention of the League of California Municipalities was held in San Francisco Dec. 12, 13 and 14. Officers for the ensuing year were elected as follows: President, Joseph Hutchinson, Palo Alto; first vice-president, Mayor Parker, Santa Cruz; second vice-president, Mr. Canfield, Chico; secretary, H. A. Mason, re-elected. Los Angeles was selected for next meeting place.

The twenty-second annual convention of the Ohio Tile, Brick and Drainage association will be held at Columbus, O., Feb. 12 and 13.

The Civil Engineers and Architects' club was organized at Burlington, Ia., Jan. 12. Emmet Steece was elected president and Ralph Slippy secretary. A committee on by-laws was appointed, composed of the following: Fred W. Salmon, M. E. of Murray Iron Works, chmn.; N. C. Hurst, M. E. of C., B. & Q. R. R.; Ralph Slippy. The committee was directed to report Jan. 19. The club expects to have a membership of about sixteen when organized.

The annual convention of the Indiana Engineering Society will be held at Indianapolis, Feb. 14th, 15th and 16th. Among the important papers to be presented are J. B. Nelson's on "Municipal Control of Water Works and Electric Lighting Plants," A. J. Hammond's on "Steam Pollution," R. L. Bailey's on the "Relation of Engineer and Contractor," V. K. Hendricks's on "Concrete as a Substitute for Brick and Stone Masonry," W. D. Pence's on the "Design and Construction of Masonry Arches," W. K. Hatt's on the "Strength ofAmerican Slag Cement," S. B. Newberry's on the "Manufacture of Portland Cement in America." Other good papers are on the list and the meeting will be profitable and interesting. J. S. Spiker of Vincennes is president.

The New England Water Works association elected officers Jan. 9 at its annual meeting as follows: President, F. H. Crandall, Burlington, Vt.; vice-presidents, Charles K. Walker, Manchester, N. H.; James Burnie, Biddleford, Me.; William E. Hawks, Bennington, Vt.; F. E. Merrill, Somerville, Mass.; F. G. Hazard, jr., Narraganset Pier, R. I.; Charles F. Chandler, Norwich, Conn.; secretary, William Kent, Narraganset Pier, R. I.; treasurer, L. M. Bancroft, Reading, Pa.

The Engineers' Society of Western Pennsylvania will hold its annual banquet Feb. 21 at Pittsburg. Reginald A. Fessenden, 410 Pennsylvania-ave., secretary.

The fifteenth annual convention of the National Brickmakers' association will be held at Old Point Comfort, Va., Feb. 11 to 16. The program contains the following papers: "Brick Pavements and the Engineer," Taylor Gleaves, Lynchburg, Va.;

"Durability of Brick Pavements," Will P. Blair, Terre Haute, Ind.; "Specifications for Construction of Brick Pavements," D. V. Purington, Chicago; "Twentieth Century Brickmaking," W. S. Ravenscroft, Ridgeway, Pa. Some of the questions for general discussion will be:

Can clay or shale be ground too fine to make good paving brick?

Is it necessary for a plant making 24,000 or more paving brick per day to use any coal fuel beside that used for burning?

Can as dense a paving brick be made out of a soft bar of clay as out of a stiff one?

Cannot a better paving brick be made from mixture of proper materials than from any single clay or shale now used for the purpose?

D. V. Purington will submit the report of the committee on "Specifications for Construction of Brick Pavements."

The ninth annual convention of the Northwestern Electrical Association was held in Milwaukee, Wis., Jan. 16, 17 and 18. Among the papers presented were the following: "Practical Line Construction," Loren W. Burch, Madison, Wis.; "The Rate Question," Henry L. Doherty, New York City; "Synchronous Converters," Prof. W. E. Goldsborough of Purdue University, Lafayette, Ind.; "The Series Incandescent Lighting System of the Future," P. D. Wagoner; "The Trade Education of Central Station Employes," Prof. D. C. Jackson. Officers for the ensuing year were elected as follows: President, E. L. Debell; first vice-president, S. B. Livermore; second vice-president, W. Worth Bean; secretary and treasurer, Thomas R. Mercein. Directors—L. E. Kerns, Wisconsin; J. H. Harding, Indiana; Charles Cuno, Wisconsin.

The one hundred and fiftieth meeting of the American Institute of Electrical Engineers was held in New York City Jan. 25. Prof. W. Elwell Goldsborough of Lafayette, Ind., presented a paper on "Air Gap and Core Distribution," and a paper by William B. Vansize of New York City on "A New Printing Telegraph."

The seventeenth annual meeting of the Connecticut Civil Engineers' and Surveyors' association was held in Hartford Jan. 9. Among the papers presented were the following: "The New Britain Electrical Subway," F. H. Oldershaw, city engineer New Britain; "The East Hartford Sewerage System," C. Henry Olmsted; "The Storm Water Problem of Hartford," Frederick L. Ford, Hartford; "A 24-inch Vitrified Pipe Conduit," W. E. Johnson, engineer Hartford water board. Officers were elected as follows: President, Henry J. Kellogg, New Haven; first vice-president, Clarence B. Voice, Hartford; second vice-president, A. J. Patton, Waterbury; secretary and treasurer, George K. Crandall, New London; assistant secretary, John K. Punderford, New Haven.

A permanent state organization of county engineers is proposed in New Jersey, and efforts will be made to secure legislation that shall provide uniformity of roads built in the different counties.

New Publications.

Hendricks' Architectural, Engineering and Mechanical Directory of the United States, over 1,200 pp., full cloth, $5.00. S. E. Hendricks Company, No. 61 Beekman-st., New York, N. Y.

The edition for 1901 of this valuable book has just been issued. It increases in size from year to year, and now contains nearly 350,000 names. The special increase in the lists in cement and road machinery industries is marked. Aside from a special publication on a single industry it is probable that this directory is more nearly complete and accurate than any other covering the same field.

Municipal Public Works—A discussion of matters of public interest to municipal officials, by Ernest McCullough, 153 pp. paper 50 cents. Published by the author, Lawiston, Idaho.

A second edition of this book being called for, it has been rewritten and the number of pages more than doubled. The chapters are on streets, drainage and sewerage, water supply, street lighting and fire department, plans and surveys, municipal ownership and the city engineer. While the last chapter is perhaps for engineers only, the book is not written for them alone, but more properly is for the citizen who is interested in municipal improvements.

It is in most respects the best book written with this object which has yet appeared. It is somewhat indefinite at times on matters which the citizens would like detail upon, but it is difficult to draw the line, and without largely increasing the size of the book there could not be much change in this regard. Both the municipal official and the civil engineer will be benefited if the hints given in the book are followed. It is not a guide for the city official to the design and supervision of work, but it instructs him in the general principles of public improvements and preaches the sound doctrine of expert aid. The chapter for the engineer in the small city is quite valuable, especially in its reference to periodicals and books for his library and to proper business principles.

The price of Frizell's Water Power, which was noticed last month, is $5.00.

A new bibliography of the world's literature on municipal problems and city conditions will be given in the quarterly number of Municipal Affairs for March, 1901. It will cover four or five hundred octavo pages with about 20,000 entries, including a topical classification and entries according to county and city, and also a list of authors. It is three or four times as large as the list published about four years ago.

Venezuelan Insurgents Endanger American Life and Property.

According to advices received Jan. 29 from Caracas, a trustworthy engineer, who has arrived there from Pitch lake, reports that the situation is critical. He says 150 English negroes who were employed to do police duty fled when the insurgents began firing into the jungles, only twenty-five Americans being left to protect the property and lives of American families. The messenger from the lake implored the United States legation at Caracas to afford protection, saying that the lives and property of Americans were exposed to guerilla attacks, firing around the lake going on nightly, and the Americans being too few to hold out long. United States Minister Loomis, according to the same advices, replied that these reports were possibly exaggerated, but that they could not be ignored, and that he would wire the facts to Washington.

The revolution in eastern Venezuela, near the asphalt deposits, is increasing, but the disturbances are remote from Caracas, which remains tranquil.

The International Asphalt Company.

The International Asphalt company was incorporated at Springfield, Ill., Jan. 9, with a capital stock of $100,000, by R. F. Conway, J. F. Reed and J. J. McCarty. The company has some large projects in view, but is not yet ready to disclose any of its plans.

Gleanings from Annual Reports of City Departments.

The report of Charles A. Brown, Superintendent of Streets in Cambridge, Mass., shows the expenditures for the year on bridges, $2,462.28; on cleaning streets, $34,499.79, of which about 10 per cent. was for new sweeping machines; collection of ashes, $27,999.94; construction of two streets, $1,363.61; for maintenance of streets, $79,999.77, $29,535.46 of this amount being for resurfacing streets with broken stone and gravel; new gravel streets, $1,624.43; paving sidewalks and edge stones, $24,998.42; watering streets, $26,000. Since 1898 the annual franchise tax of street railway corporations has been distributed among the cities and towns through which the companies operate their cars, in proportion to the mileage of tracks. In the three years 1898, 1899 and 1900, the city has received $124,208.35 from this source, of which $121,680.91 has been expended in rebuilding Harvard Square and Portland, Prospect, Cambridge, Portland and Pearl sts. in the years 1899 and 1900.

Joseph A. Volk, Leslie Smith and Albert E. Winchester are the Board of Electrical Commissioners of the city of South Norwalk, Conn. On failure, in 1892, to secure satisfactory service from the local company, a favorable popular vote appropriated $22,500 for construction of a plant for public electric lighting only. In 1897, after a long investigation, a further appropriation of $20,000 was made to enlarge the plant and furnish current for commercial lighting and power. This appropriation was increased in 1900 by $17,500, $2,500 being paid from earnings, thus making the total indebtedness for the plant $57,500. The receipts during the past year have been $9,740.79 from commercial lighting and power, $5,947 from city for street lighting and $521.19 for city buildings: a total of $16,408.98. The expenditures were $13,949.16, including $1,700 interest and $225.51 new construction. The net profit is computed at $2,484.86, after interest is paid, very nearly the difference between receipts and expenditures. There are 120 2,000-candle power lamps running from dusk till 1:30 a. m. Hereafter they will burn all night and the city will pay $72 per lamp per year. There are 2,934 16-candle power lights with 134 light customers and 15 power customers on the commercial lines.

The village of Ravenna, O., is putting its energies on sidewalk improvements, the total expenditure for this purpose in the year ending March, 1900, being $18,146.50, out of a total expenditure of $47,367.79. When $13,082.63 payment to the sinking fund is deducted, this leaves only $16,138.66 for all city purposes and other improvements. Of the sinking fund payment $2,000 is from the water works, which received during the year $12,999.43 and expended all but $606.82, $3,000 being to sinking fund and bond accounts, and the village paying nothing for fire protection. The works are clearing about $7,500 a year to be applied on payments of interest, on sinking fund and depreciation accounts, and profit to the city through remission of general tax for fire protection. The operating expenses were $5,481.50.

Personal.

J. D. Borders was elected mayor, Jan. 8, at Brookville, Fla.

Hamilton Flood has been appointed city engineer at Quincy, Mass.

Ernest Rands has been appointed city engineer at Oregon City, Ore.

Jeffry P. Thomas has been appointed city engineer at Watervliet, N. Y.

F. W. Dalrymple has resigned as city engineer at Hornellsville, New York.

George W. Sublette has been reappointed city engineer at Minneapolis, Minn.

Herbert A. Holstein has been appointed assistant city engineer at Dunkirk, N. Y.

A. C. Olney, C. E., has established an office in the Duncan building, Spartanburg, S. C.

John H. Peck has resigned the office of president of the Rensselaer Polytechnic Institute.

M. H. Schillner has been appointed city engineer at Rome, N. Y., to succeed T. A. Coleman, resigned.

Talman P. Hyde, deputy commissioner of streets for the borough of Bronx, New York City, died Dec. 25.

William E. Sapp has been elected superintendent of the Mt. Vernon water works, at Mt. Vernon, O.

Paul F. Babbridge has been appointed superintendent of water works and sewers at Keene, N. H.

J. F. Correll has been appointed superintendent of the water and electric light works at Monroe, N. C.

Frank M. Sylvester has been appointed assistant engineer in the department of bridges, New York City.

John M. Fairfield, president of the board of water commissioners Hartford, Conn., died Jan. 17 of consumption.

Col. M. A. Downing was re-elected president of the board of park commissioners at Indianapolis, Ind., Jan. 11.

Darwin Felter, superintendent of water works of Binghamton, N. Y., for twenty-five years died in that city recently.

Timothy J. Mahoney has been appointed commissioner of public works, to succeed Michael J. Healy, at Buffalo, N. Y.

James Gilbert, city gas inspector for Omaha, Neb., died in that city Dec. 31. Mr. Gilbert had filled his position since 1882.

J. H. Whitaker has resigned his position as electrician of the Northern Pacific railroad to become city electrician of Tacoma, Wash.

John Leisenring, C. E. of Upper Lehigh, Pa., died at the University hospital at Philadelphia Jan. 20, aged forty-seven years.

The address of William A. Moore, president of the National Good Roads Improvement Association, and R. W. Richardson, secretary, is 928-929 Marquette Bldg., Chicago.

A. N. Talbot, A. D. Thompson and W. K. Eldridge have been appointed a committee on brick pavements by Robt. E. McMath, president A. S. M. I., to consult with the committee appointed by the N. B. M. A.

W. W. Crosby, the recently appointed road engineer of Baltimore county, Maryland, has established his office at the county court house at Towson.

William H. Alsip, brick manufacturer, Chicago, Ill., died recently. Mr. Alsip was ex-president of the Chicago Builders and Traders' Exchange of that city.

Emil Swenson, general manager of the Keystone works of the American Bridge company, Pittsburg, Pa., has resigned his position, his resignation taking effect Dec. 31, 1900.

Frank C. Faust, formerly with the Flock & Johnson Construction company, at Murray, Ia., has accepted a position as engineer and superintendent for Robertson & Hobb, contractors, Newport, Tenn.

William R. Copeland, formerly bacteriologist for the filtration commission at Pittsburg, has been appointed bacteriologist at the testing station of the water supply of Philadelphia, to succeed Wiliam G. Toplis, resigned.

John H. Warder has been appointed secretary of the Western Society of Civil engineers, at Chicago, to succeed Nelson K. Litten, who has held the position since 1896.

Henry M. Claflen, president of the Claflen paving and contracting company, Cleveland, O., died Jan. 1, at St. Vincent's hospital.

Jacob A. Harman, C. E., and Herbert E. Hewitt, architect, of Peoria, Ill., have dissolved partnership, and hereafter each will practice his respective profession.

Dwight F. Burritt, Boston, Mass., has been appointed superintendent of the Portsmouth Gas, Electric Light and Power company, Portsmouth, N. H.

Dr. J. O. Jenkins, president of the board of aldermen, Cincinnati, O., was appointed water works commissioner, Jan. 5, to succeed Henry Higgins.

Bosler and Betts, civil engineers and surveyors, Chattanooga, Tenn., have removed their offices to the McGorman building, Birmingham, Ala.

James Z. George & Co. of Carrollton, Minn., have removed to Jackson, Miss., where they will conduct a general business as consulting and supervising engineers and architects.

Capt. Phillippe Bunau-Varilla, the eminent French engineer who was in charge of the Panama canal work for a number of years, was the guest of the Cincinnati Engineers' club Jan. 17.

R. S. Stearns will conduct a general contracting business in the electrical field in New Orleans. Mr. Stearns was formerly representative of the Westinghouse electric and manufacturing company in that city.

Robert P. Woods, city engineer of Wabash Ind., was awarded the Collingwood prize of $50 gold and a certificate from the American Society of Civil Engineers for a paper on "Street Grades and Cross Sections in Asphalt and Cement."

T. Hugh Boorman, for many years manager of the New York Mastic Works, has severed his connection with that company and has been elected president of the National Contracting company and vice-president of the National Asphalt, Brick and Tile company of 32 Broadway, New York City.

S. Whinery, C. E. New York City, has resigned his office as president of the Warren-Scharf Asphalt Paving company. Mr. Whinery served as superintendent and general manager of the company for thirteen years and as president since last August. His address for the present will continue to be Room 1,562, No. 11 Broadway.

Louis E. Fischer, formerly City Engineer and Superintendent of Electric Light and Water Works for Paris, Ill., has resigned to open an office at 810 Olive-st., St. Louis, Mo., as engineer for municipal corporations. He will have charge of the construction of the improvements the city of Paris is contemplating for the year.

Rupert Schefbauer was shocked to death by electricity Jan. 15 in the factory of the Sterling Arc Light company, New York City. Mr. Schefbauer was testing a device which he had invented, and while absorbed in his experiment he grasped a live wire and was instantly shocked to death. Mr. Schefbauer was chief electrician of the Arc Light company.

Maj. Niles Meriwether, M. Am. Soc. C. E. and city engineer of Memphis, Tenn., for fifteen consecutive years, died Dec. 29 of pneumonia. During Maj. Meriwether's administration in the city engineer's department the present superior sewerage system was inaugurated and partially completed according to his plans, and under his direction.

The committee appointed at Paris last summer, during the congress of Hygiene, to make investigations and report on questions of street hygiene in their several bearings, at the next congress, is as follows: F. Andrews Meyer, Hamburg; H. Alfred Rochling, 14 Market-st., Leicester, England; Th. Weyl, 5 Carmer Strasse, Charlottenburg-Berlin; E. Almquist, Stockholm; E. Farkas, Budapest; Rudolph Hering, New York City; A. Holst, Christiania, Norwegen; P. Lauriol, 9 Place de l'Hotel de Ville, Paris; E. von Kentkowski; L. Pagliana, Turin, M. A. an der Perk, Rotterdam; J. Polak, F. Putzeys, A. Rella, F. Schmidt.

SELECTIONS FROM THE PRESS.

Expert Municipal Officials.

The clerk of the London County Council is soon to leave his office—carrying a salary of $10,000 a year—to accept a private business position, and the fact is the subject of suggestions in London municipal circles that perhaps the regular custom of advertising for candidates for this office from anywhere in the kingdom may, because of the smallness of the salary, fail to bring a first-class applicant, while the peculiar need at this transition period—when the new local government act for London is about to be put into effect—for a clerk acquainted with the details of the disappearing system, may demand his selection from among the subordinate staff. It is explained that there would be no prospect of attracting the able town clerks of Liverpool or Glasgow, since each receives a salary equal to or greater than that mentioned, and the imminence of the reorganization of local governing agencies is urged as forbidding a period of apprenticeship for a stranger to acquaint himself with the system to be transformed.

The point of the situation is, however, that the only considerations discussed are the matter of distinctive qualifications for the position and the question of where they can be found, whether in London or elsewhere in the kingdom. Any suggestion that the choice of a candidate should be limited to some political party, to say nothing of its being limited to the "workers" therein, would be treated as an absurdity.

The criticism herein contained upon our own theory and practice of municipal government goes to the roots of our admitted inefficiency therein as a nation. It explains the death of the four women and girls at last Wednesday's fire, just as, in the main, it does paving frauds, dirty streets, deranged finances, feverish school management, and inefficiency in the thousand forms in which its results are precipitated upon the public.

It is as certain and plain as anything possibly can be that ability is the only means by which the public service can be well carried on, and that "rotation in office" and selection, whether of heads of departments or of street sweepers, for political reasons, negative the idea of able administration. No one who analyzes the situation can fail to see that popular elections in American cities must somehow be brought to turn less upon persons and more upon policies, and that officials must be chosen because of their capacity to execute in a liberal and efficient manner public mandates, rather than because they trained with one particular party in such an election.

To compare the clerk in question, whose four years' faithful services have made him seem almost indispensable to the present administrative needs of London, with the city clerk of Chicago, whose one conspicuous act within the reach of recent memory was in connection with the promotion of the defeated Ogden gas ordinance, is to bring out in humiliating but wholesome contrast the cutting logic of the two sorts of political philosophy represented by the two officials.—Chicago Tribune.

Illinois State Water Supply.

During the last few years several thousand samples of drinking water from various ordinary house wells throughout the state have been sent to the state university for analysis and report as to quality. By far the greater proportion of these water samples have proved, upon analysis, to be contaminated with drainage from refuse animal matters and consequently have been regarded with grave suspicion, or have been pronounced unwholesome for use as drink.

The present prevalence of typhoid fever in a number of places in the state makes it desirable that the public should remember that the state has made provision for the examination of all suspected waters. It is not practicable to actually isolate the typhoid fever germs, or to directly prove their absence from waters submitted for analysis: this for the reason that the work entails more labor and time than is made available by the means which the state provides. However, the chemical examination is sufficient, ordinarily, to show whether the

water is contaminated with house drainage or drainage from refuse animal matters, or whether it is free from such contamination.

All waters which contain drainage from such sources must be regarded with grave suspicion, and not used for drink unless they are previously well boiled.

Any citizen of the state may have examinations made of the drinking water in which he is interested, free from charge, by applying to the department of chemistry of the state university. Interested persons, however, should not send samples of water without first making inquiry. The department requires that the samples be collected in glass stoppered bottles, and be accompanied by a full statement as to the water and the surroundings of the well.

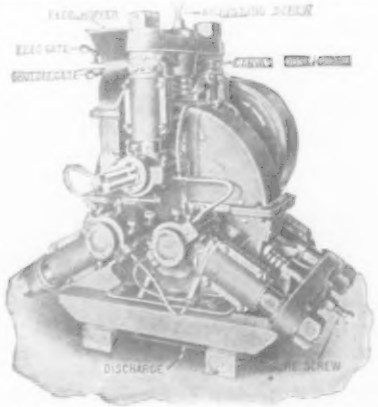
The expense to any citizen of the state, for such examinations, consists merely of the express charges which are to be paid upon the sample.—Illinois University Bulletin.

MACHINERY AND TRADE.

Kent Fine Pulverizer.

We present herewith a cut of the latest Kent pulverizer for grinding cement or limestone. This rather interesting machine is meeting with much favor for grinding limestone for use as carbonate in the top surface of asphalt pavements, cement clinker and similar substances, where a fineness of from 66 per cent. to 96 per cent on 200 mesh sieve is desired.

The principle on which the machine operates is quite distinctive, in that the rock to the depth of one inch is carried on the inner face of a heavy revolving ring, being held on this face by centrifugal force, and passing successively three internal crushing rolls,



by the outward pressure of which the rock is crushed to the fineness desired. The depth of rock between the rolls and ring affords such a body of material between the crushing faces that 95 per cent. of the rock abrades itself during reduction, thus reducing the wear on the crushing faces to about 5 per cent. of that heretofore experienced in operating such machines. The roll shafts are all mounted on cushioned bearings pressed to the work by springs, which latter hold the working parts yieldingly in position so that all vibration is taken up by the springs, thus preventing breakage and noise, and insuring a uniform crushing force.

In nine months running of one of these machines used by the Cranford company of Brooklyn, there has been no breakage, no stoppage due to the machine, and not a dollar of repair account in grinding about 8,000 tons of dust. It is claimed that the machine is just as good as the day it was started. It will reduce any screenings from two inches down to the finest dust at the rate of over two tons per hour, without requiring more than 25 H. P., and with practically no wear account. Interesting claims of the manufacturers are that the machine is noiseless and dustless in operation, and runs so smoothly that it can be set on any ground or floor without requiring a special foundation or anchor bolts to hold it down. It is guaranteed in every respect for one year and that the repair account will be less than one cent per ton.

It will be seen from the cut that the bearings are provided with water jackets so that the mill can be used to grind hot cement clinkers, roasted ore, or limestone coming from the heating drum.

The makers claim that this machine is practically indestructible; that it reduces the cost of pulverizing any hard substances at least 50 per cent. and that it can be installed in any plant at a slight expense.

Municipal Asphalt Repair Plant.

Hetherington & Berner of Indianapolis, have been awarded a contract by the city of Detroit for the construction of a stationary asphalt repair plant with a capacity of 1,500 square yards per day. The plant will be under the charge of City Engineer McCormick of Detroit. It will be of all steel fire proof construction and will embrace all of Mr. Hetherington's latest features, including steam melting and mechanical agitation. The plant will be built in one of the yards of the board of public

works and the building will be 27½x65 feet in dimension. The cost will be $10,000. The plant will be ready for operation in the spring.

The Hylo Incandescent Lamp.

The receipt of an order for the Hylo Incandescent lamp from Manila is evidence from the farthest confines of United States territory that this convenient lamp, which can be turned down to save current and give as little light as desired, is a common-sense device which the people want. There are several kinds of lamp bases, and the kind in use must be stated in ordering, that the lamps to fit may be sent.

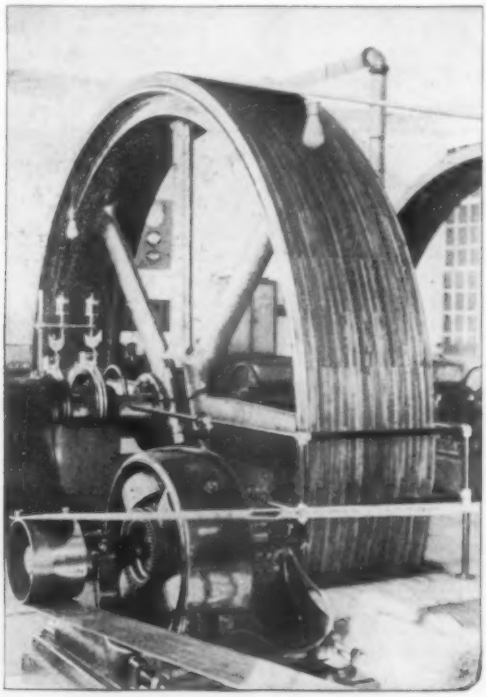
Officers of the Acme Road Machinery Company.

The annual meeting of the stockholders of the Acme Road Machinery company was held at the offices of the company in Frankfort, N. Y., on Thursday, Dec. 27, when the following directors were elected: W. A. Cook, the Hon. Elliot Danforth, T. G. Ingersol, James W. Jones, P. Pollock, Julian Scholl and A. Schaupp.

At a subsequent meeting of the directors the following officers were elected: President, P. Pollock; vice-president, Julian Scholl; secretary and treasurer, James W. Jones; general manager, W. A. Cook.

Hardwood Lagging—Its Applicatons.

Perhaps the principal product falling to machinery broker's hands is boilers and engines, the engine being the greater element of value. A stationary engine may often be secured with but little trouble and at a very attractive price as compared to a new engine. Immediate delivery is also secured and this in a great many instances is an important factor and influences the purchase. As every engine is supplied with some sort of a driving pulley or balance wheel, neither of which may be suited to the purchaser's requirements, a proper driving pulley must be provided. A quick and cheap method of accomplishing the purchaser's needs in this line is found in the applications of the hardwood laggings as manufactured by the Dodge Manufacturing company of Mishawaka, Ind., and shown in the accompanying illustrations.



HARDWOOD LAGGING FOR BALANCE WHEEL.

In the first view is shown a hardwood lagging after its application to a balance wheel

in the paper mill of the Dells Paper and Pulp company, Eau Claire, Wis. To provide against any possible failure of their water supply, this concern secured a second-hand stationary engine, which was supplied with an 18-foot 15-inch square rim balance wheel weighing 50,000 pounds. As the balance wheel was not suitable for driving purposes, it was either necessary, in order to use the engine, to secure a new driving pulley or lag this old one up. A saving of about 50 per cent. in the cost of exchanging this balance wheel towards the purchase price of a new wheel was made by using the hardwood lagging. It is 44 inches face, being grooved for 18½-inch ropes, and is capable of transmitting 750 horse power. The internal diameter is 18 feet, while its pitch diameter of ropes is 19 feet.

increased by the greater diameter, the speed of rotation remaining the same. The familiar fact of greater co-efficient of friction or driving power of the wood surface over the iron, is also a feature worthy of consideration.

The construction of the laggings is the result of many years of experience and through the use of expensive and special machinery and numerous patented appliances, as well as patents upon the construction as an entirety. After the building up process, which requires a large force of very active and expert men and almost innumerable appliances, powerful presses, etc., the inside of the rim is turned to accurately fit the face of the wheel upon it which is to go, attached to same, and face turned for belt transmission or

HARDWOOD LAGGING RUN READY FOR SHIPMENT.

The second view shows a hardwood lagging rim previous to shipment. The internal diameter of this rim was 14 feet, with 15 feet pitch diameter of ropes. It was grooved for eighteen and one-half-inch ropes for P. & F. Corbin, New Britain, Conn., who desired to transmit the power from one building to another building located on opposite side of the street, which was easily accomplished by the application of the lagging upon the engine fly-wheel and running ropes through a tunnel under the street. This lagging displaced a belt transmission as well.

As the lagging increases the effective diameter of the fly-wheel, linear velocity is grooved for a rope drive, as the case may be. This work and alterations in main drives are made with but little loss of time at small expense, when compared with the cost of new fly-wheels.

A Central Heating Plant at Washington Court House, O.

The Central Station Heating company of Cincinnati, O., has been engaged for about three months in constructing a central heating plant with a capacity for heating 300 houses at Washington Court House, O. The plant will be completed about Feb. 20. This is larger than any other heating plant of which we have knowledge. It can, we un-

derstand be increased easily to supply six, nine, twelve or more hundred houses. The plant will be operated by the Washington-Smead Hot Water company. President Smead of the Central Station Heating company reports great activity in this line and negotiations in progress for a number of other plants.

The Layman & Parpart Sanitary Street Cleaner.

The general demand for a more satisfactory mechanical method of street cleaning has resulted within the past few years in the construction of numerous machines that more nearly meet the necessary requirements of the work. There are certain well-defined conditions, other than an ability to remove dirt, that must be met by a successful street sweeping machine. It must be simple in construction, economical to operate, sanitary in disposition of the refuse and capable of removing all the dirt. The dust must be retained and the dirt gathered in such a manner to be quickly carted away.

One of the most recent and successful machines for this purpose is owned by the United States Street Cleaning company, No. 170 Fifth-ave., New York, N. Y., and is known as the Layman & Parpart sanitary street cleaner.

As shown in the above cut the machine consists of a wagon, the motive power for which can be a horse, electric, steam or other power. The entire arrangement comprises a sprinkler, sweeper, conveyor and receptacle for the dirt. The street is lightly sprinkled from a tank of water located beneath the dirt bin and in advance of the sweeper. The dirt is removed from the pavement by a revolving broom at the rear of the wagon, and is carried by a conveyor to a bin on the wagon with a capacity of two cubic yards, from which it is dumped into a cart or wagon driven alongside. The broom and conveyor are operated by an attachment to the rear wheels.

The broom and conveyor and dirt bin are tightly enclosed and there is no possibility of dirt or dust escaping. The following cut illustrates the method of dumping the dirt from the bin into the carts:

The weight on the wagon remains about constant since the amount of water in the tank decreases as the dirt accumulates. The weight of the empty wagon is about 2,200 pounds. This machine performs the entire operation of sprinkling, sweeping and loading into dump wagon and requires for the work only one team and one man thus making it very economical. The area swept per hour is limited only by the speed with which the machine is propelled. One man and team can easily clean 70,000 square yards in eight hours. The cleanliness and noiselessness of the machine also allows its use during the day. All portions of the machine, the sweeper, sprinkler and dump are under the complete control of the driver.

LAYMAN AND PARPART SANITARY STREET CLEANER.

The machine has been before the people

but a short time but its evident adaption to the purpose intended has led to its recommendation by the highest authorities in the engineering and medical professions, while a petition has been presented to the street commissioner of New York, signed by 7,000 prominent business firms, requesting the adoption of the machine for cleaning the streets of that city.

LAYMAN AND PARPART STREET CLEANER, DUMPING.

A Handsome Souvenir.

The Clinton Paving and Building Brick company, Clinton, Ind., J. W. Robb, secretary and manager, is sending to customers as a souvenir a very handsome leather-bound pocket and memorandum book which contains room for all the money the average man will have to carry around with him, in addition to which it has in convenient form facilities for noting memoranda. In connection with the latter some information is given regarding the vitrified shale and paving brick, Clinton block, sewer and sidewalk brick manufactured by the Clinton Paving and Building Brick company, together with a list of the cities and towns classified by years in which this material has been successfully in use.

Recent Inventions.

(Reported especially for MUNICIPAL ENGINEERING by Arthur M. Hood, Indianapolis, Ind. Copies of any patent may be obtained for ten cents.

662,162. Nov. 20, 1900. Fire-proof Construction. Chas. A. Balph, Pittsburg, Pa. A peculiar centering device for supporting the concrete during course of erection.

662,280. Nov. 20, 1900. Snow Melter. Jacob Mandrey, New York, N. Y. A machine for scraping snow from the street and melting the same.

662,634, 662,635. Nov. 27, 1900. Fire-proof Construction. William White, assnr. one-half to Henry Wiederhold, Philadelphia, Pa. Consists essentially of peculiar constructions of hollow refractory arch members.

662,711. Nov. 27, 1900. Catch-Basin or Fresh Air Inlet. W. H. Dewar, New York, N. Y. A gravity clock valve is placed at the discharge of the basin.

662,808 Nov. 27, 1900. Fire-proof Floor Construction. Michael J. O'Meara, Philadelphia, Pa. A peculiar cross section for tile members.

663,060. Dec. 4, 1900. Fire-proof Floor Construction. Chas. F. Buente, Pittsburg, Pa. The essential feature consists of the use of hollow refractory centers covered with concrete, and tension rods running through the concrete between the centers.

663,151. Dec. 4, 1900. Apparatus for Applying Sewage to Bacteria Beds. F. A. Barbour, Brocton, Mass., assnr. one-half to F. H. Snow, same place. A series of purification beds each with a float resting upon the liquid, each of said floats controlling both the induction to and eduction from its bed.

663,204. Dec. 4, 1900. Fireproof Construction. William White, Philadelphia, Pa. A series of half-arch blocks, each of which is provided at its inner end with male and female key faces.

663,390. Dec. 4, 1900. Street Sweeper. Chas. Z. O'Neill, New York, N. Y. A street sweeping attachment for wagons, consisting of a rotary brush and an endless elevator carrying buckets, the outer lip of each of which is formed of bristles.

663,484. Dec. 11, 1900. Drawbridge. Thomas R. Bevans, Kalamazoo, Mich. The spans are joined at the center and each is transversely movable along a horizontal track.

663,592. Dec. 11, 1900. Filter. Robert T.

Weaver, New York, N. Y. A pair of horizontal filter beds arranged one above the other and means for rotating or partially rotating each bed.

663,718. Dec. 11, 1900. Snow Melting Machine. Edward Beatty, New York, N. Y. A portable machine into which the snow may be shoveled from the street.

663,758. Dec. 11, 1900. Street Sweeper. William Hight, Macon, Ill. An attachment for wagons, consisting of a truck carrying a rotary brush and an endless elevator.

663,841. Dec. 11, 1900. Filter. Theodore J. Zoeller, Nashville, Tenn. A shaft carrying a plurality of filter drums and an inclosing reticulated cleansing drum.

663,999, 664,000. Dec. 18, 1900. Concrete Mixer, Samuel P. McKelvey, Chicago, Ill., assignor one-half to O. G. Hurson. A portable machine for mixing paving or sidewalk concrete.

664,024. Dec. 18, 1900. Street Paving, Patrick J. Moran, Memphis, Tenn. A paving in which the surface layer consists of a combination of coarse and hard stone passing through a two and a half-inch ring, a binding material of sand and cement, the portions being three parts of each kind of stone, two of sand and one of cement.

664,039. Dec. 18, 1900. Refuse-Consuming Furnace, William J. Glen, London, Eng.

664,183. Dec. 18, 1900. Ejector for Raising Sewage or Other Liquids, Isaac Shone and Edwin Ault, London, Eng.

664,532. Dec. 25, 1900. Sewage Disposal Apparatus. William L. Church, New York, N. Y. The sewage is discharged intermittently over an apron so formed as to cause the liquid to pass over sinuous courses.

664,705, 664,706, 664,707. Dec. 25, 1900. Tile for Facing Walls. David W. Anderson, Richmond, Va. Each tile is provided with a perforated flange the end of which is set into the wall, an air space being thus formed between the tile and the wall. The outer face of the tile is provided with interlocking grooves for the reception of plaster.

664,861. Jan. 1, 1901. Street Cleaning Roller. Augustin Hentschel, Berlin, Germany. The periphery of the roller is formed of rubber blades.

664,878. Jan. 1, 1901. Street Cleaner. Robert C. Menzies, Glens Falls, N. Y. A two-wheel receptacle-carrier for street cleaners with peculiar means for dumping the receptacle.

665,076. Jan. 1, 1901. System for Collecting Water from Wells. Laurence C. Eisenhut, New York, N. Y. The receiver is provided with a partition and a series of division plates, the inlets lying between the division plates so that the water is discharged directly against the partition to retard the flow and produce sedimentation.

665,317. Jan. 1, 1901. Bridge. David E. Fisher, Kenton, O. Pivoted to each upper corner of the truss is a lever, one end of each of which is attached to an angular end post. The other ends of said levers are connected in pairs by tie rods or cables extending longitudinally of the truss and passing beneath pins carried by an upright strut member thereof.

665,346. Jan. 1, 1901. Filter. Rudolph C. Reed, San Francisco, Cal., assignor of three-fourths to Herman Zadig and H. M. Levy, same place, and Solomon Hirsch, Portland, Ore. The porous filter plates are provided on contiguous surfaces with channels and upon alternate faces with ribs, which form a tortuous channel.

665,405. Jan. 8, 1901. Bascule Bridge. John P. Cowing, Cleveland, Ohio. The fulcrum end of the lifting-span is formed by circular girders to which is secured a series of rollers which form a circular roller-bearing surface which co-operates with an arc-shaped track or cradle concentric therewith.

665,435. Jan. 8, 1901. Apparatus for Purifying Sewage. August H. Heinhold, Wallwitz, Germany. A peculiar arrangement of a deep-drainage filter bed and a series of mixing tanks provided with stirring mechanism.

Reissue 11,882. Jan. 8, 1901. Fire-proof Floor Construction. Michael J. O'Meara, Philadelphia, P. Peculiarly formed transverse members for supporting concrete between structural I beams.

666,078. Jan. 15, 1901. Paving Brick or Block. Henry W. Wanamaker, Baltimore, Md. A composition formed by incorporating two natural clays, the resulting mixture containing silica, alumina, lime, magnesia and iron oxid in proportions which are carefully and very accurately set forth in the claim.

Trade Notes.

ASPHALT.

The Trinidad & Bermudez Asphalt company, Cleveland, O., filed articles of incorporation Jan. 29. The incorporators are: C. W. Warner, president; P. R. Quinlan, F. E. Cole, M. F. Bramley and John B. Cowing.

The Standard Asphalt company has removed its office from the Crocker building, San Francisco, Cal., to room 2, Bryson block, Los Angeles, Cal.

The Cranford Paving company, Washington, D. C., elected directors Jan. 8 for 1901, as follows: L. S. Filbert, J. H. Cranford, T. M. Gale, J. M. Wilson, H. H. Parmenter, Thomas Kirby and Percy Cranford. Officers were elected as follows:

President and Treasurer—J. H. Cranford.
Vice-President—Percy Cranford.
Secretary—H. S. Houghton.

BRICK.

The Boonville Vitrified Brick & Tiling company, Boonville, Mo., has been incorporated by O. D. Edwards, Louis C. Nelson, A. C. Jacobs, W. Speed Stephens and B. M. Proetz.

A vitrified paving brick plant will be located in Crawfordsville, Ind. The Poston block, which has been manufactured at Veedersburg for several years, will be manufactured by the company. Mr. Poston, who patented the block, resides in Crawfordsville. The company will be capitalized at $100,000 and will employ about fifty men at the start.

CEMENT.

A cement plant is being erected near Schoolcraft, Mich., in which Douglass & Sellers of Battle Creek are interested. The machinery has not yet been contracted for.

The H. B. Camp company, Akron, O., has plans for a new cement plant, which will cost about $30,000.

W. R. Loranger of Bay City, Mich., and

Julius Stroh of Detroit are interested in a scheme to locate a Portland cement plant in Bay county. Plans are being made for the buildings and a company will soon be organized.

The directors of the sixteen cement mills in Clark county, Indiana, met Jan. 23 and an agreement was reached by which all the plants except one, the Indiana Cement mill at Charlestown, Ind., will form themselves into a combination, known as the Western Cement company, with headquarters in Louisville. Prices will be adjusted on a higher scale.

The Buckhorn Portland Cement company, which had a plant under course of construction at Manheim, near Rowlesburg, W. Va., has made an assignment. Abram C. Mott of Philadelphia was appointed receiver, and empowered to borrow $110,000, if necessary, with which to complete the plant.

The Cayuga Lake Cement company has been incorporated by Charles C. Lee of Binghamton, N. Y., as president; M. E. Calkins, Ithaca, vice-president; C. E. Freeman, Ithaca, secretary. The selling office of the corporation will be in Binghamton. The plant will cost about $200,000, and electrical apparatus to the amount of $40,000 will be installed.

J. Keith Fisher of the British Columbia Portland cement company at Vancouver, has organized a company of American capitalists to establish extensive cement works, according to press reports.

The Consolidated Cement company of Milwaukee contemplates the improvement of its plant north of Whitefish Bay, Wis., at a cost of $25,000.

The Frank C. Morse company, 17 State-st., New York City, states that the Dragon Portland cement has been used in the vicinity of New York City as follows: Century building, Seventy-ninth-st. and West End-ave.; Yale club building, Forty-fourth-st., between Fifth and Sixth avenues; Settlement house, Fiftieth-st. and Tenth-ave.; Hartel building, Forty-first and Forty-second-sts., between Sixth-ave. and Broadway; Model tenements, Forty-second-st. and First-ave.; One Hundred and Eighty-second-st. and Madison-ave.; and Thirtieth-st. and Twelfth-ave.; schools at One Hundred and Second-st., Columbus and Amsterdam-aves., Hubert and Collister-sts., One Hundred and Eighth-st. between First and Second-aves., and One Hundred and Fifth-st. between First and Second-aves. The contractors using the cement are as follows: Marc Eidlitz & Son, Andrew J. Robinson Company, M. Caravatta, John Sweatt, William Hilgers Company, McKnight Flinter Stone company, Petriwski & Keller company.

The Indiana cement company has filed a certificate at Trenton, N. J., increasing its capital from $1,500,000 to $5,000,000. R. H. Evans, president; V. C. Faulk, secretary.

J. T. Haynes, formerly of the Garden City cement company, has opened an office at 317 Chamber of Commerce, Chicago, where he will represent the Kelley island lime and cement company of Cleveland, Ohio.

The Alsen's American Portland Cement Works company has been incorporated in New Jersey to manufacture cement for the American market. The incorporators are H. Wessel, W. Willons, H. Baasch, H. Hick, A. C. Babson and R. S. Sinclair. The new plant will be located at West Camp. The contract has been awarded to John W. Ferguson of Paterson, N. J., after plans by Lathbury & Spackman, engineers, of Philadelphia. The company will conduct the business heretofore carried on by the Alsen's Portland Cement Works company, which was controlled by a German corporation and represented in New York City by Babson & Sinclair.

The Vulcanite Portland Cement company has established an office at 317 Chamber of Commerce Bldg., Chicago, with Geo. W. DeSmet as Western sales agent.

A cement plant is proposed at Salt Lake, to be located in Parley's Canyon, Utah.

The New England Portland Cement Co., has been organized with main office in Jefferson Co., W. Va.

The capacity of the plant of the Omega Portland Cement Co., Jonesville, Mich., will be increased, and new machinery, including power, and five rotary kilns will be desired.

The Twentieth Century Portland Cement Co., Fenton, Mich., has been incorporated with C. L. Corrigan as secretary, and J. C. Edsall as general manager.

The Wayland Portland Cement Co., has been incorporated by F. J. McGrae, Daniel P. Collins, Charles E. Hoffman of Jersey City, N. J.

ELECTRIC LIGHT COMPANIES.

Articles were filed Dec. 20 at Trenton, N. J., merging the Raritan Electric Light and Power company, the Bound Brook Electric Light, Heat and Power company, the Dunellen Electric Light company, the Edison Electric Illuminating company of New Brunswick, the Railway Electric company and the Middlesex Electric company into the Central Electric company. The officers of the consolidated company are: President, Philip N. Jackson; vice-president, Adrain Riker; secretary, L. D. Howard Gilmour; treasurer, Uzal H. McCarter, all of Newark.

The Wenonah, Glassboro & Clayton Electric company has been incorporated, with main office at Putnam Grove, Pa., by Jacob P. Shannon of Philadelphia, and Casimir W. and Barnes H. Boynton of Middlesex county.

The Ossining Heat, Light and Power company, Sing Sing, N. Y., has been incorporated to manufacture and supply gas for heat, light and power in Sing Sing and Croton and manufacturing electricity for the same purpose.

The La Grange Gas company, La Grange, Ill., has been incorporated to operate a gas plant, by Benjamin F. Alschuler, John K. Newhall and E. Hinckle.

The Bellows Falls Electric Light company, which was incorporated in Maine, has reorganized under the laws of Vermont and will be known as the Falls Mountain Electric Light and Power company. It will supply electricity for light, heating and power at Bellows Falls and Westminster, Vt., and Walpole and Charlestown, N. H., and surrounding towns.

The Leachville Electric Power company has been incorporated and will build at once a large plant to furnish light and power to Leachville. The incorporators are George C. Manly and Sons, H. Tatum of

Denver, Col., and Edward S. Douglas of Tampa, Fla.

The Connecticut Electrical company, New Haven, Conn., made an assignment Jan 5.

It is believed that the Louisville Gas company, the Kentucky Heating company, the Louisville Electric company and the Citizens' General Electric company, Louisville, Ky., will be consolidated, Allen Odell, New York City, is promoter of the scheme.

Newly incorporated companies: Ssunset Electric Light and Power company, San Francisco, Cal.; Plymouth Electric Light company, Plymouth, Ind.; Chestertown Electric Light and Power company, Chestertown, Ind.; Bellows Falls Electric Light company; Hinton Light, Ice and Fuel company, Hinton, W. Va.; Cambridge City Light and Power company, Cambridge City, Ind.; San Bernardino Gas and Electric company, San Bernardina, Cal.

SEWER PIPE.

The caving in of the crown of a kiln at the Bennett Sewer Pipe company's plant, Jackson, Mich., recently, caused a loss of $2,000.

The Wood Sewage Utilization and Contracting company has been incorporated with main office in New York City, to conduct contracting business and build sewers. The incorporators are Robt. H. Bohn, John F. Zebley, Benjamin F. Dalton, John A. Fiske, John K. Millis, Clarence Delafield and Frederick F. Maronand of New York City.

MISCELLANEOUS.

A plant is being built at Central-ave. and Thirty-second-st., Los Angeles, Cal., by the Pacific Electrical works, for the manufacture of insulated wire, and it is thought that it will be in operation by Feb. 1. The officers of the company are: President, Wallace L. Hardison; vice-president, Guy L. Hardison; secretary, Frank Taylor; treasurer, Lewis W. Andrews.

Sealed bids are asked at Indianapolis, Ind., until Feb. 8 for furnishing a complete modern central office equipment for the fire alarm telegraph system. Nelson J. Hyde, chairman Board of Public Safety.

The Morava Construction company, Chicago, Ill., has been incorporated and will erect a bridge building plant on the Western Indiana Belt railway, near Eighty-fourth-st.

The Conshohocken Stone company of Philadelphia, has been incorporated under the laws of Delaware to mine, quarry and deal in and work stone.

The Keeling & Ridge company, Camden, N. J., has filed articles of incorporation and will build bridges.

The Windsor Paving company, composed of Andrew M. Eastwick, Herbert Geshwind and Edwin Hall, have dissolved partnership and Messrs. Eastwick and Geshwind have formed the general contracting and paving firm of Eastwick and Geshwind.

The Interstate Electrical Wire Subway company, Kansas City, Mo., has been incorporated by W. S. Woods, William Huttig and Joseph J. Heim.

The National Contracting company, Jersey City, N. J., has been incorporated to contract bridges, by H. C. Kennedy, S. H. Stuart and K. K. McLaren.

The American Bridge company of New York, with principal offices in New York City, has been incorporated with directors as follows: Herbert Wright, Henry Schoonmaker and John P. Tuomey of Brooklyn; W. De Saussure Trenholm, Robt. Walker, Joseph P. Colton, jr., and Wm. L. Ball, New York City.

IMPROVEMENT AND CONTRACTING NEWS.

PAVING.

Sydney, Australia—A cycle path, nearly two miles long and having a uniform width of ten feet has been completed in this city.

Sioux City, Ia.—Formal objections have been filed with the city clerk by the property-owners, who are protesting against the new special assessment law.

Milwaukee, Wis.—The report of City Engineer Poetsch shows that during 1900 the cost of paving was as follows: Brick, 1,227 miles, $65,000; asphalt, 4.35 miles, $250,801; stone, 0.121 mile, $9,016. The city also laid during the year 7.63 miles at a cost of $75,747.

Nashville, Tenn.—A resolution has been adopted authorizing the appointment of a committee to investigate the question of purchasing all the turnpikes in the county and making them fine roads. The committee is composed of C. B. Harwood, W. C. Dodson, L. C. Hessey and J. B. Whitsett.

St. Paul, Minn.—The report of City Engineer Claussen for 1900 shows that during the year the following work was accomplished: Paving, 4½ miles; cement walks, 17.300 miles; sewers, 4.09 miles; manholes, 85; catch basins, 33; grading streets and alleys, 1.36 miles; cycle paths, 5 miles.

Seattle, Wash.—The use of Kettle river sandstone for paving heavy traffic streets is favorably referred to by City Engineer Thomson and Superintendent of Streets Little, in their report to the city council. They call attention to its toughness, which causes it to wear flat and not spall.

Toledo, O.—A new system to regulate the awarding of paving contracts in this city is proposed, which provides that a foot frontage majority petition, filed before bids for paving a street are opened, shall determine the material to be used in paving; that no later petition be considered at all; that in case no majority petition is filed the committee shall award the contract to the lowest bidder.

Weeping Water, Neb.—The Republican invited communications in December from professional and business men and women, on the improvements most urgently needed, in their estimation, to make this a better town. Among the improvements most urgently advocated were the following: paving

the principal streets; paving sidewalks with brick; building a town hall of brick; electric light plant; increasing the water supply.

CONTEMPLATED WORK.

Freeport, Ill.—Street paving is proposed.

Petosky, Mich.—Paving is contemplated this spring.

Topeka, Kas.—The paving of Western-ave. is proposed.

Findlay, O.—Paving is contemplated for N. Cory-st.

Elkhart, Ind.—Brick paving is proposed for Beardsley-ave.

Seattle, Wash.—Brick paving is proposed for Occidental-ave.

Brooklyn, N. Y.—Asphalt paving is desired for DeKalb-ave.

Passaic, N. J.—Bergen-st. will be graded, curbed and guttered.

Bay City, Mich.—Paving will be recommended for a number of streets.

Albert Lea, Minn.—The question of street paving is being agitated.

Eufaula, Ala.—The question of paving Broad-st. is being agitated.

Helena, Mont.—The question of paving Main-st. is being discussed.

Rockford, Ill.—National-ave. will be macadamized its entire length.

Indianola, Ia.—Paving is urged for the public square and side streets.

Bowling Green, O.—The question of street paving is being discussed.

Atlanta, Ga.—The sum of $5,000 will be appropriated for paving Peters-st.

Durham, N. C.—This city voted Jan. 8 to issue bonds for street improvements.

Fairfield, Ia.—The question of paving the public streets is being agitated.

Coshocton, O.—A petition is being circulated for paving Cherry-st. with brick.

Fitchburg, Mass.—Bonds for street and sidewalk improvements have been sold.

St. Louis, Mo.—Ordinances have been passed for paving Nineteenth-st. with brick.

Saginaw, Mich.—Plans have been approved for improving Washington-ave. and Perry-st.

Terre Haute, Ind.—A petition is being circulated for brick paving on S. Fourth-st.

Jacksonville, Fla.—Ordinances have been passed for paving several streets with brick.

Chicago, Ill.—Asphalt walks are contemplated for the campus of the University of Chicago.

Woodbury, N. J.—The board of freeholders has decided to construct three new roads.

Los Angeles, Cal.—An ordinance has been passed for paving Pico-st. C. H. Hance, cy. clerk.

Oakland, Cal.—Union and Howard-sts. will be paved and graded. A. S. Newburg, cy. clk.

Joplin, Mo.—A resolution has been passed providing for asphalt paving in S. Main-st.

Toronto, Ont.—Asphalt paving has been recommended for King-st., and macadam for Parliament-st.

La Crosse, Wis.—A new ordinance for street paving has passed second reading. Mayor Anderson.

Montgomery, Ala.—Bids will be received about March 1 for road improvements. J. M. Garrett, co. engr.

Peoria, Ill.—Brick paving is contemplated for St. James-st., from Elizabeth to University.

Minneapolis, Minn.—The question of paving Washington and Twentieth-aves. is being considered.

Niagara Falls, N. Y.—The city clerk has been directed to ask for bids for paving Buffalo-ave.

White Horse, N. W. T.—The feasibility of constructing a wagon road to the Big Salmon is being considered.

Macon, Ga.—The citizens on Spring and Walnut-sts. have petitioned for the paving of that thoroughfare.

Conneaut, O.—A petition is being circulated for paving lower Harbor, Broad, Buffalo and Sandusky-sts.

Springfield, Mo.—A resolution of intention has been passed to pave Clifton-st. with brick or block.

Pittsfield, Mass.—The question of paving North and West-sts. has been referred to a special committee.

Napa, Cal.—A resolution of intention has been passed to macadamize Calistoga-ave. H. H. Thompson, clk.

Akron, O.—City Engineer Payne has been directed to prepare plans for paving Grant and E. Market-sts.

Baltimore, Md.—Ordinances have been passed for paving Montford-ave. with brick and Bayard-st. with asphalt block.

Braddock, Pa.—The question of issuing $8,500 bonds for street and sewer improvements will be voted on Feb. 19.

Portsmouth, Va.—The council has authorized an issue of $50,000 bonds for street improvements in the Fifth ward.

Denver, Col.—Sherman-ave., between Eighth and Fourteenth-aves., will be paved with disintegrated granite this year.

Toledo, O.—The property-owners in Greenwood-ave., from Oak to Yondotega-sts., want the street paved with asphalt blocks.

Syracuse, N. Y.—The council has decided to pave Warren, Willow, Canal, Pearl and W. Jefferson-sts. R. R. Stuart, cy. eng.

Cincinnati, O.—City Engineer Stanley has been authorized to prepare plans and specifications for paving Beckman-st. with granite.

Newark, N. J.—The city surveyor has been authorized to prepare estimates for paving certain streets in East Newark with brick and asphalt.

East Orange, N. J.—The sub-committee has reported favorably regarding the improvement of Bedford-st. Objections will be heard Feb. 11.

Canton, O.—W. Second, Third and Fourth-sts. will probably be paved.

Cincinnati, O.—The board of public service has decided to construct asphalt and granite boulevards on Mt. Adams.

Cincinnati, O.—A resolution has been passed to pave Gilbert-ave. with brick. Robert Allison, pres. B. P. S.

La Crosse, Wis.—Petitions are being circulated asking that a number of streets be paved with brick this year.

Syracuse, N. Y.—Plans and specifications for paving Gifford-st. will be prepared by R. R. Stuart, cy. eng.

Atlanta, Ga.—The citizens of the Fourth ward are urging council to complete the asphalt paving on Edgewood-ave.

New Ulm, Minn.—An ordinance is proposed requiring that cement walks replace the present walks as rapidly as possible.

Topeka, Kas.—Plans and specifications

are being prepared by the city engineer for paving and building sidewalks.

Goshen, N. Y.—The issue of $200,000 bonds for road improvements has been authorized by the board of supervisors.

East Orange, N. J.—A petition has been presented to council asking that Bedford-st. and Elwood-ave. be macadamized.

Dallas, Tex.—The question of voting on the proposed issue of $200,000 bonds for road improvements is being considered.

St. Paul, Minn.—The question of paving Rosabell-st. with Kettle river sandstone is being considered. C. H. Bronson, clk.

Baker City, Ore.—The question of paving Main-st. with asphalt, vitrified brick or wooden blocks is being considered.

Birmingham, Ala.—Mayor Drenen says that nearly $500,000 will be expended during 1901 for paving and improving the streets.

Washington, D. C.—A bill has been introduced in the senate providing for the paving of Columbia road west of Fourteenth-st.

E. Liverpool, O.—This city has decided to pave Pennsylvania-ave. with brick instead of macadam. John A. George, cy. eng.

St. Joseph, Mo.—An ordinance was passed Jan. 22 providing for asphalt paving on Ashland-ave., to the city limits, one-half mile.

Woodbury, N. J.—The estimated cost of constructing a stone road on Delaware-st., to the intersection of Crown Point road, is $8,900.

Davenport, Ia.—The question of improving Bridge-ave., paving Fifteenth-st., and grading Kirkwood boulevard, is being considered.

Brooklyn, N. Y.—Highway Commissioner Keating has been authorized to pave with asphalt portions of Sixth and Seventh-aves. and Manhattan-st.

New Philadelphia, O.—The council has given notice of intention to pave portions of Broadway and High-sts. and East-ave. with brick.

Riverside, Cal.—Asphalt paving is being discussed for a number of blocks of streets in the center of the city. Joseph W. Johnson, cy. engr.

Bonds for street improvements have been sold as follows: Carnegie, Pa., $10,000; Petersburg, Va., $75,000; Montgomery, Ala., $100,000; Cherry Hill, N. J.

Dickinson, N. Y.—Plans and specifications for about 9,000 feet of road in this town have been prepared by H. C. Allen, city engineer of Syracuse.

Avalon, Pa.—Ordinances have been passed for improving Taylor, Florence and Riveraves. E. E. Custard, clk. of coun.; J. S. Dailey, burgess.

Memphis, Tenn.—The legislative measure authorizing an issue of turnpike bonds to the amount of $150,000 has been adopted by the county court.

Plattsburg, N. Y.—The county board of supervisors has voted $13,300 for the building of three miles of road. This is one-half the amount required.

Buffalo, N. Y.—The council approved, Dec. 26, the five-year repair proposition of the various asphalt companies, which has been pending since July 11.

East Orange, N. J.—An ordinance has been introduced for grading, curbing and paving Bedford-st., between Elmwood-ave. and Vailsburg line, with Telford.

Peoria, Ill.—Estimates were submitted Jan. 9 for paving Randolph-ave., from North to Chambers, with asphalt, and Water-st., from Main to Chestnut, with brick.

Cairo, Ill.—An ordinance providing for grading and graveling Twenty-seventh-st., from Washington-ave. to Walnut-st., has been referred to the ordinance committee.

Duluth, Minn.—Estimates have been submitted by City Engineer McGilvray for paving Superior-st., from Eighth-ave. to Twenty-third-ave., E., with block and sheet asphalt.

Bay City, Mich.—The residents of Midland-st., from Center-st. to Euclid-ave., and Center-st., from Midland to Ohio-st., have petitioned for brick, asphalt or asphalt block paving.

La Crosse, Wis.—The board of public works has recommended the paving of twenty-five blocks of street with brick. The property-owners in the residence portion will ask for paving.

St. Paul, Minn.—The council will require the Union Depot company to grade, pave and build sidewalks around the depot, in consideration of vacating certain streets for the company.

Woonsocket, R. I.—The street department has asked for an appropriation of $39,000 for improvements and for paving Clinton, N. Main, Social and Cumberland-sts. with macadam.

Milwaukee, Wis.—A resolution is pending in council which provides for paving Cedar-st., from Fifth to Sixth with asphalt, and for macadamizing Sixth-st., from Cedar to State.

Bristol, Va.—A committee of five was appointed from the Virginia council, Jan. 4, to confer with the Tennessee council regarding the paving of Main-st., between the two cities.

South Bend, Ind.—The residents of this city and of Mishawaka contemplate the construction of a boulevard 100 feet wide between the two cities; estimated cost, $50,000. L. A. Hull, cy clerk.

Vicksburg, Miss.—The survey for the main roadway for the new National military park has been completed. It will be about eight miles long and will have four iron bridges. W. T. Rigby, com.

Sioux City, Ia.—John Erickson, city street commissioner, recommends the construction of forty miles of brick, cement and stone walks during this year to take the place of wood and other unimproved walks.

Lakewood Hamlet, O.—(Special.)—R. J. Wood, engr., has been instructed to prepare plans, profiles and specifications, for paving Clifton boulevard, and bids will be asked on asphalt, brick and macadam.

West Hoboken, N. J.—The township committee of North Bergen decided recently to grade, build sidewalks and otherwise improve Smith-ave. and Danielson-st. Emil J. Foerch, twp. clerk; Chas Dietz, chairman com.

San Francisco, Cal.—Specifications have been approved for paving Sacramento, Clay and Washington-st., between Montgomery and Sansome-sts., with asphalt or bituminous rock on concrete; estimated cost, $6,633.

Grand Rapids, Mich.—Estimates have been prepared for contemplated street improvements as follows: James-st., macadam; N. Union-st., creosoted wood block, asphalt

block and asphalt; W. Leonard-st., brick; Madison-ave., gravel.

New York City—Mayor Van Wyck has approved paving ordinances as follows: Stanhope-st., Wyckoff-st. to St. Nicholas-ave., asphalt; Linden-st., Hamburg and Knickerbocker-aves., granite block; Chauncey-st., Rockaway-ave. and Broadway, asphalt.

Grand Rapids, Mich.—Resolutions were introduced Jan. 14 for grading and gravelling portions of Eureka-ave. and Phillips-st. The question of paving N. Union-st. with asphalt or creosoted wood blocks is being agitated.

Trenton, N. J.—Ordinances were passed Jan. 4 for paving S. Broad-st., from Chestnut-ave. to Liberty-st., with asphalt on concrete, and State-st., from N. Willow-st. to the D. & R. Canal, with asphalt over Belgian block. C. E. Murray, cy. clk.

Hamilton, O.—Estimates have been completed for paving Court, B and Dayton-sts. and Ross-ave. with asphalt, asphalt block and vitrified brick. Plans, specification and estimates will be submitted for paving N. Seventh st. Cy. Eng. Dillon.

St. Joseph, Mo.—The county court has under consideration a proposition to macadamize Ashland ave., from the east city limits to Oakland cemetery, one-third mile. An ordinance has already been introduced in the council providing for paving the avenue from Frederick-ave. to the city limits with asphalt.

Albany, N. Y.—Plans have been prepared for constructing a large number of roads, and have been accepted by the boards of supervisors of various counties. The counties' shares of the expense have been appropriated and as soon as the legislature makes the state's share of the appropriation bids will be advertised and contracts awarded.

Seattle, Wash.—An ordinance has been passed providing for concrete walks, wood curbs, gutters and crosswalks on Eighteenth-ave., from E. Columbia to E. Howell-st. Ordinances have been passed for grading and planking 12 streets. The street committee has recommended asphalt paving with concrete curbs and brick gutters for Madison-st., from Terry-ave. to Broadway. W. V. Rinehart, prest. cy. com.

Indianapolis, Ind.—The question of street improvements in this city depends largely upon the course taken by the legislature in regard to amending the Barrett law. Among the improvements needed are the following: Meridian and Illinois-sts., from Fall creek to Thirty-fourth-st.; portions of E. Tenth, W. Tenth, W. Washington, Shelby, Bellefontaine, Ohio and the unimproved portions of Merrill-st.

Seattle, Wash.—Estimates have been submitted for the contemplated improvements, as follows: Grading and walks, Virginia-st., from Fourth-ave. to Denny way, $8,850; cement walks, Thirtieth-ave., S., from Yesler to Dearborn, $5,200; grading E. Thomas-st., $4,250; grading First-ave., N., $5,900; grading E. Fir-st., $3,550; grading E. Thomas and E. John-sts., $4,500. Vitrified brick paving is proposed for Occidental-ave., from Yesler way to the King-st. coal bunkers.

CONTRACTS TO BE LET.

Lake Geneva, Wis.—Bids are asked until Feb. 6 for furnishing 200 cu. yds. of gravel. C. H. Gardner, cy. clerk.

Greensburg, Ind.—Sealed bids are asked until Feb. 1 for paving the walks on Broadway with brick. Wm. R. Brazelton, cy. clerk.

Cincinnati, O.—Sealed bids are asked until Feb. 15 for paving Dayton and McKeon alleys with brick. Robt. Allison, prest. bd. pub. service.

Bedford, Ind.—Sealed bids are asked until March 4 for constructing gravel and macadamized roads in Shawswick twp. John M. Gainey, co. audt.

Marion, Ind.—Sealed bids are asked until Feb. 20 for macadamizing and asphalting the Home boulevard in Center twp. Paris Hoover, chmn. bd. co. com'rs.

Houston, Tex.—Bids are asked until March 4 for paving Congress-ave. with asphalt, vitrified brick or macadam. S. H. Brashear, mayor. I. A. Miller, cy. eng.

Columbus, O.—Sealed bids will be received until Feb. 7 for reflooring the roadways and sidewalks of the Grand View-ave. bridge over the Scioto river, Franklin twp. L. E. Jones, co. audt.

Atlantic City, N. J.—Sealed bids are asked until March 6 for constructing a gravel road from May's Landing to Pleasantville, a distance of twelve miles. John T. Irving, dir., Elwood. John J. Albertson, engr., Magnolia.

Cincinnati, O.—Sealed bids are asked until Feb. 7 for macadamizing Observatory-ave. Robt. Allison, prest. bd. pub. service. Sealed bids will be received until Feb. 2 for improving Blue Ash-ave., Sycamore twp. E. L. Lavis, co. audt.

Ripon, Wis.—Sealed bids are asked until Feb. 20 for curbing, protection curb, vitrified brick paving, iron gutter bridges, wood gutter bridges and cast iron gutters for carrying water under the street crossings. O. C. Stickles, chmn. bd. pub. wks.

Toledo, O.—Sealed bids are asked until Feb. 4 for paving Glenwood-ave. and an alley with vitrified brick or Kreodone creosoted blocks. Sealed bids are asked until Feb. 15 for paving Field-ave. and Vance-st. with vitrified block or Kreodone creosoted blocks. J. E. Connell, cy. clk.

Atlanta, Ga.—Sealed proposals are asked until Feb. 4 for furnishing and setting tile sidewalks and cement curbing, stone curbing, brick sidewalks, relaying granite block pavements, furnishing cement, broken stone and chert. H. P. Collier, com. pub. wks. R. M. Clayton, cy. eng.

CONTRACTS AWARDED.

Washington, D. C.—A contract for 50,000 feet of stone paving has been awarded to W. H. & S. H. Venable.

Gainesville, Fla.—The contract for constructing a stone road was awarded to D. G. Edwards of Micanopy, for $3,080.

Seattle, Wash.—The contract for cement walks on Broadway, from Yesler-way to Roy-st., was awarded to F. McLelland for $23,427.

Indianapolis, Ind.—The contract for graveling the roadway and building sidewalks on Raymond-st. has been awarded to George W. McCray.

Tampa, Fla.—W. L. Spitler submitted the lowest bid, Jan. 16, for 17,850 square yards of brick paving and 8,468 lineal feet of granite curbing at $30,000.

York, Pa.—The contract for laying arti-

ficial stone pavements on Springetsbury-ave., from George to Water-sts., was awarded to Frank L. Lehman & Co.

Toledo, O.—The contract for paving George-st., from Cherry to Locust-sts., with Nelsonville block, has been awarded to George H. Cole for $4,396.90.

Louisville, Ky.—Contracts for vitrified block paving in a number of streets has been awarded to George W. Gosnell and L. R. Figg, at a total cost of $60,000.

New Orleans, La.—J. A. Craven & Co. secured the contract for paving a roadway with square blocks, at 64 cents a square yard; new curb, 42 cents a square foot. Total, $1,396.80.

Birmingham, Ala.—Donelson & Calvin were awarded a contract Jan. 16 for paving Huntsville-ave. with chert at $1.05 a sq. yd., or $6,658. Bids were received for macadamizing a number of other streets and paving various sidewalks.

Cedar Rapids, Ia., (Special)—The contract for 18,000 yds. of asphalt paving on Fifth-ave. and Division-st. was awarded Jan. 4 to the R. F. Conway company of Chicago, at $1.69 a sq. yd., for paving, and 50 cents a lineal foot for curbing; total, $33,220. The Barber Asphalt Paving company bid $1.76, and the Bermudez Asphalt Paving company $2.02.

Rochester, N. Y.—Contracts were awarded Jan. 4 for repairing the asphalt streets as follows: Rock Asphalt company, streets paved with rock asphalt, $1.57 a sq. yd. without concrete, and $2.36 with concrete. Whitemore, Rauber & Vicunus all other asphalt paved streets, $1.65 without concrete, and $2.50 with concrete.

Toledo, O.—Bids were received Jan. 7 for 4,370 sq. yds. of paving on Indiana-ave., as follows: Warren Scharf Asphalt Paving company, Trinidad pitch lake asphalt, $2.42 a sq. yd; Athens block, Buckeye block and Harris pavers, $1.80 on concrete and $1.50 on sand. Garrigan Bros., Athens, Buckeye, Medal, Met., Nelsonville and Perkins blocks and Harris pavers, $1.60 on concrete and $1.40 on sand; Logan block, $1.55 on concrete and $1.35 on sand; Kreodone creosoted block, $2.60 and $2.40; asphalt block, $2.39. Kirlin Bros., Athens, Buckeye, Medal, Met., Nelsonville and Perkins blocks and Harris pavers, $1.65 and $1.30; Logan block, $1.64 and $1.29. C. H. Burchenal, asphalt block, $2.24. William J. McMahon, $1.60 and $1.20 for block pavements, on concrete and sand respectively; asphalt block, $2.20. Barber Asphalt Paving company, block pavements, $1.75 and $1.50; Trinidad pitch lake asphalt, $2.40.

SEWERS.

South Bethlehem, Pa.—The South Bethlehem Sewerage company has been incorporated.

Galveston, Tex.—Dr. C. H. Wilkinson, city health physician, advocates municipal ownership of the sewerage system.

Dallas, Tex.—The municipal government contemplates testing its rights under the city ordinances and constitution to compel property-owners to connect with the city sewers.

Columbus, O.—A committee composed of Dr. Probst, Dr. Crossland and Dr. Warner, members of the state board of health, visited several eastern cities recently for the purpose of inspecting sewage disposal systems. The cities visited were Worcester and Lowell, Mass., Providence and Pawtucket, R. I.; New York City and Albany and other cities.

Philadelphia, Penn.—A big concrete sewer has been constructed to connect with the McKean-st. sewer at Swanson-st. It is an experiment in engineering and as such has attracted the attention of engineers in all parts of the country. The whole interior is constructed of cement held together by steel girders and rests on a platform of stone.

CONTEMPLATED WORK.

Dexter, N. Y.—A sewerage system is contemplated.

Mt. Sterling, Ky.—A sewerage system is contemplated.

Flushing, L. I., N. Y.—A 20-ft. trunk sewer in Newtown is proposed.

Celina, O.—The question of constructing a sewerage system is being agitated.

Hartford, Conn.—Bids will be asked soon for building a sewer in Wadsworth-st.

Pittsburg, Pa.—Ordinances have been adopted for sewers in a number of streets.

Centralia, Ill.—The construction of a sewerage system is urged by the press.

Olathe ,Kas.—An ordinance was adopted Jan. 15 for a sewerage system. Mayor Hodges.

Columbus, Ga.—The present sewerage system is inadequate and a new system is proposed.

Newark, N. J.—Plans for the Central relief sewer have been completed and bids will be asked soon.

Normal, Ill.—An 8-in. pipe sewer in Mason-st. and a 15-in. sewer in Fell-ave. are proposed.

Mt. Sterling, Ky.—The question of building a sewerage system is said to be an important one.

Chattanooga, Tenn.—A sewer is proposed on Vulcan-st., between Whiteside and Milliane-sts.

Hagerstown, Md.—The question of building a sewerage system is being considered by the sewerage commission.

Huntington, L. I., N. Y.—The question of sewer construction is being considered by the property-owners.

Wakefield, Mass.—Plans are being prepared for a sewerage system. Orlando K. Morgan, engr., sewer com.

Milwaukee, Wis.—The council has recommended the appropriation of $88,000 for sewer work this year.

Waterbury, Conn.—Sewers are proposed for Cottage-place, Hill and Hopkins-sts.; Cy. Engr. Cairns.

Circleville, O.—An ordinance has been introduced providing for a main sewer. Mayor Row.

Belleville, Ill.—The city council is considering the question of constructing the Richland creek sewer.

Fitchburg, Mass.—Plans for a sewerage system are being prepared by Freeman C. Coffin of Boston.

Haddonfield, N. J.—Efforts are being made by two rival companies to obtain a franchise for a sewerage system.

Swissvale, Pa.—An ordinance has been passed to increase the bonded debt $105,000 to build a sewerage system.

Brockton, Mass.—The sewerage commis-

sioners will ask for an appropriation of $35,000 for sewer work this year.

Findlay, O.—Bids will be received Feb. 7 for the purchase of $16,000 sewer bonds. Frank C. Ray, city clerk.

Columbus, O.—An ordinance has been adopted for constructing three pipe sewers. John L. Barr, cy. clk.

Braddock, Pa.—The question of issuing bonds for sewer and street improvements will be voted on Feb. 19.

Winona, Minn.—The city engineer has been directed to devise a storm water drainage system and to prepare plans and profiles.

Lestershire, N. Y.—The question of constructing a sewerage system and a new reservoir is being considered.

Merchantville, N. J.—Plans for a sewerage system have been prepared by F. A. Dunham, C. E., of Plainfield, N. J.

Pasadena, Cal.—A resolution has been passed for building sewers in Kensington-place, Vernon and Millard-aves., and Mary-st.

Bozeman, Mont.—An ordinance is pending in the city council which provides for a comprehensive sewerage system.

Springfield, O.—Plans and estimates are being prepared for the Main-st. sewer which will be 4,800 feet long.

Newport News, Va.—The citizens of the North End have asked the council to construct a sewerage system in that section.

Buffalo, N. Y.—City Engineer Bardol has prepared for plans for a forty-five-inch sewer across Cazenovia Park; estimated cost, $87,000.

Middleboro, Mass.—The council will ask the legislature for authority to issue bonds for constructing a system of sewage disposal.

Dexter, N. Y.—The citizens are agitating the question of building sewerage and water works systems and an electric light plant.

Binghamton, N. Y.—Rudolph Hering of New York City has been engaged as consulting engineer on the proposed sewer extensions.

Waukegan, Ill.—The construction of a drain on W. Worthington-st., from the ravine to Buttrick-st., is proposed. Engr. Bowen.

Weehawken, N. Y.—The construction of a sewage pumping station for the lower section of the town is favored by Twp. Engr. Bond.

Riverside, Cal.—The city engineer has been directed to prepare plans for the extension of the Arroyo sewer, and for a sewer in block 3, range No. 3.

West Hoboken, N. J.—Plans for the construction of a southern outlet sewer, to connect with the proposed new Hoboken sewer, are under consideration.

Richmond, Va.—The street department will ask for an appropriation of $800,000, the greater part of which will be used for the proposed sewer extensions.

Seattle, Wash.—Plans and specifications have been approved for a sewer on Nineteenth-ave. 2,000 feet long and for a sewer on Eighth-ave.

East Providence, R. I.—The East Providence Sewer company, recently incorporated, will ask for a franchise for building a sewerage system for this city.

New Albany, Ind.—A syndicate has applied for a franchise for constructing a complete sewerage system in this city according to local press reports.

Camden, N. J.—Ordinances have been passed for the construction of an underground drain or culvert on Second and Cherry-sts. H. C. Kramer, clk. coun.

Minneapolis, Minn.—In his annual report City Engineer Sublette calls attention to the necessity of extending the sewerage system.

Collingwood, O.—A resolution was adopted Jan. 22 for constructing drains in sewerage and drainage district No. 2. O. Jenkins, mayor. L. A. Wilson, clk.

Rockaway Beach, L. I., N. Y.—A trunk sewer between Rockaway Park and Morton's creek at Edgemore, with a disposal plant on the Arverne Meadows, is proposed.

Muscogee, I. T.—The construction of a sewerage and water works system is contemplated as soon as the treaty between the United States and the Creek nation has been adopted.

Fond du Lac, Wis.—George S. Pierson, C. E., Kalamazoo, has been engaged to make an inspection of the present sewerage system, with a view to making recommendations for improvements.

Newport, Ky.—The water works commissioners recommend in their annual report that the water works department assume charge of the flushing of the sewers and the sewer tapping.

Reading, Pa.—The question of constructing the intercepting trunk sewer in the northeastern sections of the city and for sewers in Frankfort and Eleventh-sts., is being considered.

Jackson, Mich.—The state has appropriated $15,000 for sewers for the state prison, and the city will expend about $35,000 for the construction of sewers in Grand-st., to connect with the state system.

Kansas City, Mo.—Both branches of the city council passed eight ordinances Jan. 16 establishing sewer districts in sewer division No. 3, preparatory to the proposed extension of the O. K. creek sewer.

The question of issuing bonds for the construction of sewerage systems will be voted at the following places: Irwin, Pa., Feb. 19; Mamaroneck, N. Y.; Springfield, N. J.; Pottsville, Pa.; Columbus, Ga., Feb. 6; Shawnee, Okla. T.; Corona, Cal.; Durham, N. C.

Baltimore, Md.—An ordinance has been approved for a sewer on Canton-ave., estimated at $13,500. Dr. James Borley of the health department urges the construction of a general sewerage system as the most urgent necessity confronting this city.

Chicago, Ill.—The estimated cost of the proposed new intercepting sewers, pumping stations and machinery is $1,800,000. The town of Cicero is reported as having applied to the sanitary board for permission to build a sewerage system to be connected with the drainage canal.

Washington, D. C.—The district commissioners have ordered the construction of a sewer on certain streets. The appropriation in the District of Columbia bill for the filtration plant does not specify any particular system of filtration. The tabulated report in the bill indicated that the American system was to be used, but the bill contains no such limitation.

Plainfield, N. J.—Joseph O. Osgood, C. E., has recommended the septic tank purification system for this city. His plans provide for two concrete septic tanks, 50x100 ft. deep, and 450,000 gals. capacity for 24 hours. From the tanks the septic liquid is to flow over aerating weirs to channels leading to the contact beds, of which there are eight. Of these beds four are at a higher elevation than the others, thus enabling them to give a double contact treatment to the septic fluid.

Traverse City, Mich.—(Special)—Irving Watson, cy. engr., says he has completed plans for sewer district No. 8, covering about 1,400 acres. The council has acted favorably on the committee's report recommending the construction of 1,080 ft. of 34 in., 2,775 ft. 15 in., and 2,080 ft. 9 in. sewer; estimated cost, $7,875. The remodeling and extension of sewers in district No. 4, by laying 2,250 ft. 15 in., and 3,150 ft. 12 in. sewer, is recommended by the committee. Plans for district No. 7 are nearly completed, and part of it will probably be built this year.

CONTRACTS TO BE LET.

Toledo, O.—Sealed bids are asked until Feb. 4 for building a cylindrical pipe sewer in an alley. John E. Annell, cy. clk.

Greenwich, Conn.—Bids are asked until Feb. 11 for building two miles of pipe sewers and 500 feet of tunnel. S. E. Minor, boro. clk.

Litchfield, Minn.—Contract will be sold Feb. 27 for digging and constructing ditch No. 9, in sections of 100 feet. J. N. Gaynor, co. audt.

Alexandria, La.—Sealed bids are asked until Feb. 6 for works connected with improving drainage. J. G. White, pres. bd. state engrs.

Delaware City, Del.—Bids are asked until Feb. 15 for constructing a sewerage system at Fort Du Pont. J. De Lafitte, const. Q. M.

St. Petersburg, Russia.—Competitive plans for a sewerage system will be received until Aug. 31, 1901, by a municipal commission. Prizes of $6,480, $4,100 and $2,100 respectively for the best three plans.

Akron, O.—Bids are asked until Feb. 9 for the construction of a main trunk sewer in districts 1, 6, 8 and 9, including lampholes, manholes, ventilators and specials. Chas. H. Isbell, cy. clk.

Cleveland, O.—Sealed bids are asked until Feb. 13 for furnishing material and building two shafts and a tunnel to cross under the old river bed from Sycamore to Elm-sts. Walter P. Rice, dir. pub. wrks.

Findlay, O.—Sealed bids are asked until Feb. 7 for the construction of brick and pipe sewers in sewer district No. 2, with manholes, catchbasins, lampholes, flush tanks, etc. Frank C. Ray, cy. clk.

Atlanta, Ga.—Sealed bids are asked until Feb. 4 for furnishing vitrified sewer pipe, cast iron catchbasins and manhole covers, brick, and for constructing sewers. H. P. Collier, comr. pub. wrks. M. Clayton, cy. engr.

Santiago, Cuba—Sealed bids are asked until Feb. 8 for furnishing cast and wrought iron pipe fittings, lead and yarn, vitrified sewer pipe and tile drain, and vitrified sewer brick. Chambers & Hone, No. 60 New-st., New York City.

Washington, D. C.—Sealed bids are asked until Feb. 16 for furnishing and erecting one compound expansion crank and flywheel condensing pump, together with one vertical tubular boiler and necessary auxiliaries for a sewage pumping plant.

Chicago, Ill.—Sealed bids will be received until Feb. 20 for excavating solid rock from the south fork of the south branch of the Chicago river, near Thirty-fifth-st.; for excavating through the spoil bank of the sanitary district on the north side of the main channel at the east end of sec. K. Alex J. Jones, pres. by trustees of sanitary dist.

Great Falls, Mont.—Sealed bids are asked until Feb. 4 for the construction and extension to Sixth-st., main sewer, including the following: Fifty cu. yds. solid rock exc.; 100 cu. yds. soft rock exc.; 12,200 cu. yds. earth exc.; 2,435 cu. ft. 28-in. pipe; 1,190 ft. 18-in. pipe; 600 ft. 6-in. pipe, 15 manholes; 20 catchbasins. W. H. Smith, cy. clk.

Plainfield, N. J.—Bids are invited until Feb. 18 for improvements to the sewage disposal beds as follows: Seven thousand cu. yds. earth exc.; 14,300 cu. yds. filling; 2,400 cu. yds. concrete; 2 wooden gate houses; 1,565 ft. 4 to 15-in. pipe sewer; 3,720 ft. 3 to 10 in. distributing pipe; 1,950 lbs. cast iron, etc. J. Garrett, cy. engr.

CONTRACTS AWARDED.

Iowa City, Ia.—The contract for a brick sewer on Davenport-st., was awarded, Jan. 10, to Wm. Harrabin, for $1,324.60.

Spokane, Wash.—P. Costello was awarded a contract for a sewer on First-ave., between Ash and Spruce-sts., for $3,284.

Waterford, N. Y.—M. F. Dollard & Co. of Albany secured the contract for the North Side sewer for $14,931.95.

Jersey City, N. J.—The M. T. Connelly Contracting company was awarded the contract, Jan. 8, for a sewer in Henderson-st.

Terre Haute, Ind.—The contract for laying 3,000 ft. of sewer pipe in the Southern Indiana yards was awarded to Voorhees & Grimes.

Huntsville, Ala.—The contract for laying a sewer main from the mill to the Big Spring branch was awarded to Hutchens & Murdock.

Chicago, Ill.—The contract for the completion of the Thirty-ninth-st. intercepting sewer was awarded, Jan. 7, to John P. Agnew.

Bakersfield, Cal.—Sewer contracts have been awarded as follows: No. 1, Lindgren & Hicks, $4,500; No. 2, City Improvement company, $7,000.

Toledo, O.—The contract for the Tredwell-st. sewer was awarded, Jan. 12, to T. J. Kelly for $15,139.40. H. P. Streicher secured the contract for a sewer in the alley between Palmer and Noble-sts. for $6,611.62.

Milwaukee, Wis.—The contract for 1,250 lin. ft. of tunnel of 12 ft. in diameter, in section No. 2 of Kinnickinnic river flushing works tunnel was awarded, Jan. 23, to Meehan & Courtney of Chicago for $41,750.

Bayonne, N. J.—The M. T. Connelly Contracting company of Jersey City secured contracts for two sewers in this city as follows: Avenue F, E. Twenty-first-st. and vicinity, $16,747; Avenue D. between Eighteenth and Twenty-fourth-sts., $7,594.

Paterson, N. J.—Contracts were awarded, Jan. 18, for sewers in five streets as follows: Walnut-st., $523, and Hemlock-st., $386, Peter

Both & Co.; E. Thirtieth-st., Francis P. Murray, $528; Madison-ave., Philip Kramer. $209; Putnam-st., McLean & Lees, $344.

Allegheny, Pa.—Sewer contracts were awarded, Jan. 7, as follows: Lateral sewer in Brighton road, from present sewer near Harbison's north line to Fremont-ave., $2,234, and from Island-ave. to present sewer near Home-st., $3,669; Samuel Gamble. Main sewer in Marshall-ave., $10,643, and main sewer on Brighton road and Winthorp-st., $7,460, North Side Coal and Land company.

Madison, Wis.—Bids were received, Jan. 11, for constructing two settling tanks and appurtenances, requiring about 580 cu. yds. Portland cement concrete; 800 cu. yds. earth exc.; 700 cu. yds. earth embankment; 27,000 ft. B. M. timber; 400 ft cast iron pipe; 360 ft. vitrified pipe. The bids were as follows: Nicholas Quinn, $8,987; J. W. Mitchell, $8,627; John T. Blake, Dubuque, Ia., $7,020.

Marietta, O.—Bids were received Jan. 15 for building sewers in the third sewer district, as follows: Adams Bros., 4-in. pipe, work and material, 27 cts. a lin. ft; 8-in., 47 cts.; 10-in., 51 cts.; 12-in., 55 cts.; manholes, $27; flush tanks, $35; lampholes, $8; John Wilking, 4-in. pipe, 27 cts.; 8-in., 71 cts.; 10-in. pipe, 74 cts.; 12-in., 85 cts.; 15-in., $1.01; manholes, $25; flush tanks, $35; lampholes, $5. The contract has not yet been awarded.

Boston, Mass.—Bids were received Jan. 12 for constructing and erecting two triple-expansion engines to be connected to pumps for pumping 50,000,000 gals. of sewage per 24 hrs. through head of 45-ft. The bids include economizer, feed water heater, boilers, traveling crane, piping, etc. The bids were as follows: Camden Iron works, Philadelphia, $116,000, with centrifugal pumps; Henry R. Worthington, Brooklyn, $107,000, including centrifugal pumps; $101,000, with vertical fire tube boilers; $223,000, with reciprocating plunger pumps; Holly Manufacturing company, $233,000, with reciprocating plunger pumps; Holly Manufacturing company, $228,000, with horizontal water tube boilers; E. P. Allis company, Milwaukee, $124,000, with centrifugal pumps, and $190,000 with reciprocating plunger pumps; Dickson Manufacturing company, Scranton, Pa., $256,000, with reciprocating plunger pumps, based on 160 lbs. (gauge) initial steam pressure.

WATER-WORKS.

Seneca Falls, N. Y.—Seneca Falls water works plant will be sold at foreclosure sale, Feb. 15.

Boise, Idaho—Municipal ownership of the water works is advocated in the report of Councilman Phelps.

Vineland, N. J.—The water plant has been purchased by this city from Charles Keighley's Sons, for $80,000.

Rensselaer, N. Y.—The residents of this city and Bath will have filtered water by Feb. 1. The installation of the filtration plant has cost $50,000.

Conneaut, O.—The plant of the Conneaut Water Works & Supply company, consisting of machinery, mains, franchises, etc., will be sold by Receiver Frederick O. Howe.

Baraboo, Wis.—The Baraboo water works will be offered for sale June 12, by a United States marshal. The plant is valued at $100,000. This city will bid on the plant.

Dansville, N. Y.—Municipal ownership of the water works and electric light plant is proposed.

San Francisco, Cal.—The question of acquiring municipal water works will be voted on Feb. 1, 1901. Of the two propositions to be submitted, one provides for bringing the water from the Sierras, and the other contemplates the purchase of the plant of the Spring Valley Water company.

Independence, Kas.—In a decision rendered by Judge Skidmore, Jan. 15, the injunction to prevent the city from building a water works plant was dissolved. The bonds were voted last spring, but the injunction secured by the Cherrydale Water company prevented the city from building the plant. Work will begin at once.

Alton, Ill.—A bill was filed in the United States circuit court Jan. 7 by the Farmers' Loan & Trust company of New York, to purchase a mortgage against the Alton Water Works company and the New England Water Works company, given Jan. 1, 1887, to secure $200,000 of 6 per cent. bonds issued on that date and payable Jan. 1, 1907, and for a receiver.

Newly incorporated companies: Florida, N. Y.; Water, Ice & Light Co., Groesbeck, Tex.; Forest Lawn Water Co., Forest Lawn, N. Y.; El Paso Pure Water Co., El Paso, Tex.; Warren Water Co., Warren, Ind.; Euclid-ave. Water Co., Pasadena, Cal.; Artesian Water Co., Santa Paula, Cal.; Buffington Water Co., Buffington twp., Indiana Co., Pa.; Blacklick Water Co., Blacklick twp., Cambria Co., Pa.; Garfield Water Co., Bolivar, Pa.; Penngrove Water Co., Penngrove, N. J.; East Wheatfield Water Co., East Wheatfield twp., Indiana Co., Pa.; Cyclone Water Co., Azusa, Cal.; Imperial Water Co., No. 3, Los Angeles, Cal.

Lincoln, Neb.—Suit was filed in the United States circuit court in this city, Jan. 21, against the city of Beatrice, Neb., to collect the sum of $100,000 bonds issued by that city for the purpose of building and maintaining the city water works system. The petition cites that the city issued bonds to the amount of $115,000 to build and extend the water works system, and that until 1899 interest on the indebtedness was met; that the latter year the city defaulted in its payments and has since refused to make a levy for the purpose of paying the interest.

CONTEMPLATED WORK.

Camden, Me.—A reservoir is proposed.

Grinnell, Ia.—A better water supply is proposed.

Kokomo, Ind.—A municipal water works system is proposed.

Monett, Mo.—Bonds have been issued for improving the water supply.

Yardley, Pa.—Plans will be made soon for a water works system.

Whitman, Mass.—The sinking of test wells for a water supply is proposed.

Asotin, Wash. (special)—It is proposed to put in some new pipe for the water company.

London, O.—The water works company contemplates putting in an air compressing pump.

Lexington, Ky.—The citizens are endeavoring to secure a better water supply.

Taylorville, Ills.—All consumers will be compelled to place water meters on their hydrants.

Goshen, N. Y.—A bill has passed authorizing this place to improve and extend its works.

Buffalo Lake, Minn.—An engineer will be engaged to make plans for a water works system.

Pawtucket, R. I.—The estimated cost of the proposed pumping plant is $75,000.

Oskosh, Wis. — The Northern hospital needs new pumps and a filtering plant, according to press reports.

Belle Plain, Minn.—Plans and specifications for a water works system will be made by H. H. Woodman.

Loveland, Colo.—The town council has decided to consider the question of an additional water supply.

Sharpsburg, Pa.—The expenditure of $18,000 for certain improvements is recommended by J. Schinneller in his report.

East Grand Forks, Minn.—An ordinance has passed first reading providing for a water works system.

Brookings, S. D.—The question of a water supply for irrigation and domestic purposes is being considered.

Cicero, Ill.—The commissioners appointed to investigate the water and light question advocate municipal ownership.

Auburn, Neb.—A resolution has been adopted offering liberal inducements to private concerns to put in a water and light plant.

Harrisburg, Pa.—An ordinance was passed Jan. 7 appropriating $75,000 for a new pumping engine and to repair the motor house.

Gloucester, Mass.—The board of water commissioners have asked for authority to expend a sum not exceeding $200,000 for improving the water.

Providence, R. I.—A new pumping station is recommended by William H. Barclay, commissioner of public works, in his annual report.

The question of issuing bonds for water works construction has been favorably voted on at the following places: Bonaparte, Ia.; Woodbine, Ia.

Collingwood, O.—A resolution was passed Jan. 25 providing for the issue of bonds for erecting water works by extending the present system. O. Jenkins, mayor.

Oswego, N. Y.—The mayor has been authorized to correspond with expert chemist relative to an analysis of the water taken from the Oswego river.

Muskogee, I. T.—The construction of water works is contemplated to begin immediately after the treaty between the United States and the Creek nation is signed.

Melrose, Mass.—Mayor Larrabee recommends that an appropriation be made each year for cast iron water pipe to replace the forty-five miles of cement pipe in the present system.

Lakewood Hamlet, O.—Special.—Bids are asked for laying 28,000 lin. ft. 6 and 10 in. cast iron pipe in Clifton boulevard. R. G. Wood, hamlet engr.

The question of issuing bonds for water works will be voted on at the following places: Hannibal, Mo.; White Lake, Minn.; Napoleonville, O., Feb. 12; Rutherfordton, N. C.

Philadelphia, Pa.—The department of public works has retained John W. Hill, C. E of Cincinnati, in connection with the improvement, extension and filtration of the water supply of this city.

Sullivan, Ill.—Engineers have been engaged, according to press reports, to make estimates and plans for a new and adequate water supply to be obtained from driven wells and pumping stations.

Bills have been introduced in the legislature for authority to build water works in the following places: Dexter, Me.; Traverse City, Mich.; Attleboro, Mass.; Williamsburg, Mass.; Seaford, Del.; Newcastle, Del.

St. Louis, Mo.—Two bills have been introduced in the municipal assembly, which provide for the expenditure of $225,000, including extensions, improvements and completion of the high-service system and the location of new mains.

Chicago, Ill.—A tunnel 4,300 feet long, to be built under the lake to connect the old two-mile crib with the new Carter H. Harrison crib, is proposed by City Engineer Erickson for the completion of the water system.

Trenton, N. J.—(Special.)—The board of water commissioners have retained Charles Hogue, 39 Cortland-st., New York City, as consulting engineer in the proposed installation of a new 15,000,000 gal. pumping engine. He will prepare plans and specifications.

The construction of water works is contemplated at the following places: Chaska, Minn.; Amherst, Wis.; Radcliffe, Ia.; Wilmington, O.; Aberdeen, Wash.; Cassadaga, N. Y.; Oshawa, Ont.; Syracuse, Ind.; Tullahoma, Tenn.; Elmer, N. J.; Scotch Plains, N. J.; Thomasville, N. C.; Adairsville, Ga.; Peoria Hights, Ill.

New York City—The board of public improvement has authorized the laying of a 20-in. water main in Pelham-ave. and Pelham boulevard, from Third-ave. to Eastern boulevard. The board of estimates and apportionment has authorized the issue of $4,000,000 bonds for increasing and improving the water supply. The sum of $1,800,000 has been voted to be expended in the improvement of Brooklyn's supply as follows:

For lands required for the 48-in. pipe conduit under contract, pumping stations and storage reservoirs, $300,000. For the construction of storage reservoirs on Massapequa and East Meadow creeks, $1,200,000. For improvements to pumping stations, $200,000. For coal houses, pumping machinery, storehouse, etc., at Milburn pumping station, $100,000.

CONTRACTS TO BE LET.

Woodstock, Va.—Sealed bids are asked until Feb. 15 for constructing a water works system. Com.

Monodovi, Wis.—Bids are asked until Feb. 19 for building water works. John D. Pace, chmn. com.

Sleepy Eye, Minn.—Bids are asked until Feb. 6 for a boiler, 50 flues, etc. Peter Geschroninal, vil. rec.

Lancaster, Wis.—Bids are asked until Feb. 14 for drilling for an increased water supply. Ed. M. Lowry, chmn. comm.

Cuyahoga Falls, O.—Bids are asked until Feb. 2 for furnishing 712 tons of cast iron pipe. G. R. James, secy. W. W. trustees.

Ottumwa, Ia.—Sealed bids are asked until

Feb. 11 for constructing a complete water works. E. Hogland, chmn. water com.

St. Louis, Mo.—Sealed bids are asked until Feb. 8 for furnishing two 36-inch discharge valves. Robt. E. McMath, pres. B. P. I.

Kenosha, Wis.—Sealed bids are asked until April 2 for furnishing and erecting one vertical cross-compound pumping engine of 4,000,000 gallon capacity. R. H. North, supt.

Atlantic City, N. J.—Sealed bids are asked until Feb. 11 for furnishing a pumping engine of 3,000,000 gallons capacity. Louis Kuehnle, chmn. water comrs.

Cleveland, O.—Sealed bids are asked until Feb. 15th for furnishing water gates, cast iron water pipe and special castings and fire hydrants. Walter P. Rice, dir. pub. wrks.

Lake Providence, La.—Sealed bids are asked until Feb. 20 for the construction of a combined water works and electric light plant. G. M. Franklin, mayor.

Cincinnati, O.—Sealed bids are asked until Feb. 13 for tubular and water tube boilers, with mechanical stokers and brick work complete, at Front-st. pumping station. Robt. Allison, pres. B. P. S.

Louisville, Ky.—Bids are asked until Feb. 20 for furnishing the material and constructing a system of American (mechanical) filters for the Louisville Water company. Chas. R. Long, pres.

Brookline, Mass.—Sealed bids are asked until Feb. 19 for building and erecting a vertical triple expansion crank and fly-wheel pumping engine of 5,000,000 gallons, at the Low Service Pumping Station for this city. Water board.

Grand Rapids, Mich.—Sealed proposals will be received until Feb. 15 for furnishing this city with a permanent pure water supply of not less than 10,000,000 gals., bidders to furnish maps, plans and specifications. Jos. Emmer, pres. pro tem., B. P. W.

Pittsburg, Pa.—Separate and sealed bids are asked until Feb. 8 for furnishing and erecting in the Brilliant pumping station two compound condensing high-duty pumping engines, and for the inspection of pumping engines. Geo. H. Nelson, dir. dept. pub. wks.

Troy, N. Y.—Sealed bids are asked until Feb. 8 for furnishing cast iron pipe; constructing a diverting dam and reservoir near village of Quackenkill; furnishing 1,300 brls. Portland cement. John Philan, com. public works.

Philadelphia, Pa.—Bids are asked until Feb. 11 for the improvement, extension and filtration of the water supply, as follows: Contract No. 8, sand ejector; No. 9, cast iron water pipe and special castings, trenching for pipe laying, stop and check valves, stop boxes, frames and covers; No. 10, Lower Roxborough filter plant. Wm. C. Haddock, dir. pub. wrks.

St. Louis, Mo.—Sealed bids are asked until Feb. 8 for laying pump main No. 9, including 18,024 lin. ft. 36, 30, 12, 6-in. pipe, 14 hydrants, 12,000 cu. yds. earth embankment, 170 cu. yds. brick masonry, 84 cu. yds. concrete, 2?5 cu. yds. rip-rap, 8,700 ft. B. M. lumber. Robt. E. McMath, pres. B. P. I.

CONTRACTS AWARDED.

Woodstock, Va.—The contract for building water works was awarded to G. W. Minor of Davis, W. Va.

Pleasanton, Cal.—The contract for a municipal water works system was awarded to Williams, Baker & Co., for $17,075.

Mena, Ark.—The franchise for a complete water works system was granted Jan. 9 to O. G. Gorman of Dallas, Tex.

Two Rivers, Wis.—F. T. Miller of Chicago was awarded the contract Jan. 18 for a water works and electric light plant.

New Albany, Ind.—The Indiana Water company is endeavoring to secure a franchise to establish a water works system in this city.

Indianapolis, Ind.—A new contract has been made between the city and the Indianapolis Water company by which the city saves $2,000 a month in the new rates, gets more water for public use, and a short time contract.

Pittsburg, Pa.—The contracts for laying the water mains were awarded Jan. 5, as follows: 1st sec. with riveted pipe, F. A. Gillespie company, $92,000; 2nd sec. F. A. Gillespie company, $377,500; 3d sec., Booth & Flinn, $195,000.

BRIDGES.

Newhope, Pa.—A new bridge is proposed to span the mill-dam.

Lincoln, Me.—A petition is being circulated asking for a bridge at Lincoln Centre.

Iowa City, Ia.—The citizens of the north end have petitioned for a new bridge.

Conneaut, O.—A high-level bridge across the Conneaut river is needed.

Newburyport, Mass.—A bridge is contemplated across the Merrimac river by the county commissioners.

Buffalo, N. Y.—The question of building the Grand Island bridge is being revived.

Pittsburg, Pa.—Plans have been completed for an iron bridge to connect Pius and Mission-sts.

Topeka, Kas.—The question of building two new bridges across the Kansas river is being discussed.

Sparta, Tenn.—A bridge across Caney Fork at Sparta and Spencer-road crossing is contemplated.

Nashville, Tenn.—An appropriation of $800 has been voted for a new bridge over Eaton's river.

Gates, Ore.—A petition has been submitted to the county court asking for a bridge across Santrani river at Gates.

South Omaha, Neb.—The question of building a bridge over the Platt river at Cedar Creek is being revived.

Waukesha, Wis.—The city council has decided to build an iron bridge across the Fox river at Forest-st.

Illiopolis, Ill.—The supervisors of Christian county have decided to build a bridge over the Sangamon river.

Miles City, Mont.—Bids are being asked until March 4 for a steel wagon bridge across the Tongue river. Co. clk.

Aberdeen, S. D.—The county board has decided to build a bridge across the Elm, three miles south of Ordway.

East Liverpool, O.—A company has been formed to build a bridge over the Ohio river at the head of Babb's Island.

Michigan City, Ind.—An appropriation for a drawbridge over the harbor, at Second-st. H. M. Wiles, cy. engr.

Fort Plain, N. Y.—Plans are being con-

sidered for a new iron or steel bridge to replace the one burnt recently.

York, Pa.—Sealed bids are asked until Feb. 26 for all new bridges to be built during 1901. C. C. Boslow, co. clk.

Gray's Point, Mo.—A bill was passed Jan. 22 authorizing the erection of a bridge across the Mississippi river at this place.

Ft. Wayne, Ind.—Plans have been prepared for a bridge over St. Mary's river to replace the present covered wooden structure.

Minneapolis, Minn.—The residents of South Town are making an effort to secure a wagon bridge connecting Cedar-ave. with Eleventh-ave., S. E.

St. Louis, Mo.—The citizens of the city of East St. Louis, Ill., contemplate building a bridge with a 565 foot span across the Mississippi river.

Rowelsburg, W. Va.—An order has been passed by the county court for the construction of an iron bridge across the Cheat river, at this place.

Pine Bluff, Ark.—A bill has been introduced in congress authorizing the construction and maintenance of a steel drawbridge over the Arkansas river.

Canajoharie, N. Y.—The officials of this place and Palatine have perfected plans for a new bridge across the Mohawk river to replace the one burnt Jan. 17.

Columbus, O.—The county commissioners have received a petition asking for a bridge over Rock Fork creek, about two and one-half miles north of Ganamer.

Riverside, Cal.—Sealed bids are asked until Feb. 6 for a bridge across Temecula creek, one and one-half miles southeast of the town of Temecula. W. W. Phelps, co. clk.

French Indo-China—Bids will be received until May 9 for a bridge over the Arroyo Chinais, by the director of public works for Cochin, China, at Saigon.

Chicago, Ill.—City Engineer Erickson has pronounced four bridges dangerous and says that five are so unprotected that the engineering department has refused to accept responsibility for damages.

Cincinnati, O.—The property owners in Rochelle, Stetson, Shillito, Piedmont, Arizona and Goodman-sts., have petitioned for a viaduct for foot passengers and vehicles across the Corrywood ravine.

STREET LIGHTING.

Midland, Md.—A municipal electric light plant is proposed.

Augusta, Ga.—A municipal electric light plant is contemplated.

Utica, N. Y.—This city's electric light contract expires next fall.

Mankato, Minn.—Municipal ownership of the electric light is proposed.

Fremont, Neb.—A new electric light plant is proposed, the old being inadequate.

Gloversville, N. Y.—The electric light plant will be rebuilt in the spring.

Jackson, Tenn.—The city council has decided to build its own electric light plant.

Oshkosh, Wis.—Mayor Mulva advocates municipal ownership of the electric lighting plant.

Fond du Lac, Wis.—A new co-operative electric light plant is to be established in this city.

Stella, Ia.—A company has been formed of local business men to light this town with electricity.

The question of issuing bonds for an electric light plant will be voted on at Farmington, Mich.

York, Pa.—Bids are asked until Feb. 12 for lighting this city. Frank DeHuff, secy. lighting com.

St. Paul, Minn.—The contract for gas and electric street lighting was awarded to the St. Paul Gas Light company.

The question of issuing bonds for an electric light plant has been favorably voted on at Gowanda, N. Y.

Greenville, Mich.—A fifty-year franchise has been granted to N. S. DeMoulin and William Fay, York, Pa.

Mt. Sterling, Ill.—(Special)—A. E. Condee, cy. clk., says this city will construct an electric light plant this year.

Kendallville, Ind.—A committee has been appointed to inquire into the feasibility of a municipal electric light plant.

Steubenville, O.—The question of granting a franchise for an electric light and heating plant will be voted on Feb. 20.

Paducah, Ky.—A municipal electric light plant is proposed owing to the Paducah Electric Light company raising its rates 25 per cent.

Dundee, N. Y.—Bids are asked until Feb. 12 for equipping a plant to be constructed in Pennsylvania. Bailey & Goble.

Baldwins, (L. I.), N. Y.—The establishment of a gas plant to light this and other cities is proposed by New York capitalists.

Collinwood, O.—A resolution has been passed to erect electric light works by enlarging the present plants and system. O. Jenkins, mayor.

Detroit, Mich.—The contract for a complete lighting plant has been awarded to the Northern Electrical Mfg. company of Madison, Wis., for $35,865.

Litchfield, Ill.—The contract for lighting this city was awarded to the Litchfield Light and Power company for 5 years at $72 per lamp per year.

Richmond, Ind.—The contract for a municipal electric light plant was awarded to the Varney Construction company of Indianapolis for $144,490 complete.

Sturgis, Mich.—A council committee has been appointed to confer with the Citizens' Electric Light company for the purpose of purchasing its plant.

Nashville, Tenn.—Plans and specifications for the city's electric light and power plant will be made by Prof. Chas. S. Brown of Vanderbilt university.

Lyons, N. Y.—A five-year contract has been awarded the Lyons Electric Light and Power company for all-night street lighting service every night in the year at $80 per lamp.

Plainfield, N. J.—Councilmen Valliant, Rogert and Lee have been appointed a committee to investigate the advisability of establishing a municipal electric light plant.

Loveland, Colo.—A ten-year franchise was granted L. Kelim, at $7.50 per light per month for 16,000 c. p. incandescent arcs;

$1.50 per light per month for incandescent lamps of 32 c. p., for street lighting.

Springfield, O.—The contracts for the Springfield Gas Co., and the Springfield Light & Power Co., for street and public lighting at $24 per lamp post and $73 per arc light have been approved.

The construction of electric light plants is contemplated at the following places: Pierce, Neb.; Woodstown, N. J.; Holgate, O.; Magnolia, Ark.; Thayer, Mo.; Lexington, Tex.; Brockton, N. Y.; Tellahoma, Tenn.; Lakota, N. D.; Greenville, Mo.; Lisbon, O.; Mayville, Mich.; Gary, S. D.; Alger, O.; Central City, Neb.

GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

Davenport, Ia.—A crematory is contemplated.

South Bend, Ind.—A garbage crematory is proposed.

Spokane, Wash.—The Dixon crematory has been recommended at a cost of $21,000.

Atlantic City, N. J.—The estimated cost of improving the city crematory is $25,000.

Cathan, Ont.—Information is desired regarding methods of cleaning brick paved streets. J. W. Shackleton, cy. engr.

Detroit, Mich.—The three-year contract for collecting and disposing of the city garbage expires June 30th. Mayor Maybury favors a municipal crematory.

San Francisco, Cal.—A contract for street cleaning has been awarded under the new specifications prepared by the Merchants' Association as follows: District No. 1, the first class streets, 77 cts. per 1,000 sq yds; streets of all other classes, 69 cts.; district No. 2, of all streets, 39¼ cts. a 1,000 sq yds. L. M. King, Supt. Merchants' Association.

TOO LATE FOR CLASSIFICATION

Niles, Mich.—A new bridge will be built across the St. Joseph river at Main-st.

St. Paul, Minn.—Macadam paving is desired by the property owners on W Seventh-st.

Menominee, Mich.—The intake of the water works will be extended into water forty-five feet deep this winter.

Syracuse, N. Y.—Asphalt paving is contemplated for Euclid-ave. from College-place to Westcott-st.

Rock Island—An ordinance was passed Jan. 21 to pave Thirty-eighth-st. from Fifth to Eighteenth-ave.

Custer, S. D.—The business men are endeavoring to secure water works, electric lights and telephone.

Sparta, Wis.—Brick paving is contemplated for the business streets this year. H. Greasdale is interested.

River Forest, Ill.—Bids are being asked according to press reports for lighting the streets. Bd. of trustees.

Buffalo, N. Y.—The legislature will be asked to change the city charter relating to petitions for pavements.

Wichita, Kas.—A petition is being circulated to pave William-st. from the government building to the Santa Fe tracks.

Minden, La.—A franchise has been granted to Felix Drake, Thomas Crichton and R. H. Miller for an electric light plant.

Saginaw, Mich.—The plans for paving Sidney-st., between Washington and Jefferson-aves., will probably be changed from macadam to brick.

Cleveland, O.—The contract with the Cleveland Electric Illuminating company to light this city with electricity was approved Jan. 21.

Ogden, Utah—Notice was filed Jan. 22 giving notice that the city will ask for the appointment of a receiver for the Ogden water system.

Le Roy, N. Y.—The citizens have appointed a committee to advise with the board of water commissioners in regard to obtaining a permanent water supply.

Cambridge, O.—The city council has renewed a contract for electric street lighting for ten years, at $70 per light for 112 lights for all dark hours.

Morgantown, W. Va.—The citizens of S. Morgantown-ave. are petitioning the town council to call an election for the purpose of voting on the question of paving.

Salina, Mich.—The common council has decided to purchase about twenty arc lights for street lighting purposes. The citizens favor the purchase of the plant of the Preston W. Shute Acetylene Gas company.

Bloomington, Ill.—The question of an increased water supply is being considered. A petition will be circulated asking that W. Chestnut-st. from Main to Western-ave. be paved.

New Haven, Conn.—The citizens on Howard-ave., passing through the First, Second and Third wards, a distance of about two miles, are divided on the subject of asphalt and brick paving.

Wapakoneta, O.—(Special)—Samuel Craig, Co. Surv., says a petition is being circulated asking the council to pave Blackhoof-st. with brick or blocks. The work will involve about 10,000 sq. yds.

Albany, N. Y.—The common council voted Jan. 21 in favor of cheaper electric light. The ordinance on which the vote was taken directs the board of contract and supply to let a contract for street lighting at a price not to exceed 28 cents per lamp.

Ann Arbor, Mich.—The city attorney was directed Jan. 21 to draw up an enabling act to go before the legislature, which will permit this city to bond for $30,000 for building a city hall and also to issue bonds for the purchase of the water works.

Syracuse, N. Y.—The board of contract and supply decided Jan. 22 to ask for bids for lighting the streets with electricity. The proposals will provide for the maintenance of 1,200 street arc lights for five years and incandescent lights for the city buildings for the same period. The bids will be advertised ten days.

Creston, Ia.—Mayor Skinner and a special committee are in Omaha, Neb., investigating the Nebraska gas system in that city. This city has been in darkness since the first of the year. When a contention of eleven years' standing between the city and the Creston Gas and Electric company resulted in the severance of all relations between the two, and the lighting service was discontinued. The council will make nothing but a one-year contract with the company, while the company wants a five-year contract.